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RECOGNITION AND APPLICATION OF VOWEL
GENERALIZATIONS BY GRADE FOUR
CHILDREN

BY
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A THESIS
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The undersigned certify that they have read, and
recommend to the Faculty of Graduate Studies for accept-
ance, a thesis entitled "Recognition and Application of
Vowel Generalizations by Grade Four Children" submitted
by Sharon Lorane Dickson in partial fulfilment of the
requirements for the degree of Master of Education.

ABSTRACT

This study tested grade four pupils' ability to recognize vowel phonic generalizations when presented inductively and deductively and their ability to apply these generalizations in written and oral materials.

The experimental group used in this study consisted of 146 grade four pupils from five schools which had been selected by the Edmonton Public School Board. A vowel generalizations test, examining five vowel generalizations, was constructed by the investigator. It measured the pupils' ability to recognize generalizations presented inductively and deductively as well as measuring their ability to apply these generalizations in written and oral reading materials. This was a group test except for the oral reading section which was administered individually. The testing was carried out in May, 1970.

Statistical analyses, by means of a one-way analysis of variance and a one-way analysis of covariance, was performed. z scores were also calculated using a test of the significance of the difference between two proportions for correlated samples. Informal analysis of errors on the oral reading section was also reported.

These analyses revealed that the ability to recognize vowel generalizations whether presented inductively or deductively was significant beyond the .05 level in comparing pupils' performance on the written form of the application

test but was not significant on the oral form of the application test. In terms of their degree of difficulty the means of the scores of the five vowel generalizations were significantly different beyond the .001 level. Sex was not a significant factor in predicting scores on the vowel generalizations test. Good readers did significantly better than poor readers beyond the .05 level on each section of the vowel generalizations test. A predictor for deductive recognition of vowel generalizations was inductive recognition of vowel generalizations although the converse was not true. The results of the oral form of the application test could be predicted by the pupils' performance on the written form of the application test. The ability to work with generalizations whether presented inductively or deductively was a predictor of the performance on the written form of the application test but not on the oral form of the application test. The pupils did not make appropriate links between the sounds and symbols of vowels. In order to make the content meaningful when reading orally, there was a tendency to substitute real words for nonsense words. The nonsense words containing the final e were found to be the most difficult both in recognition and application.

On the basis of the results of this study, a number of implications for teaching vowel generalizations are presented.

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CHAPTER I

THE PROBLEM

I. STATEMENT OF THE PROBLEM

In school systems today the value of phonics in a reading program is generally recognized as being beneficial (Betts, 1957, p. 615; Dechant, 1964, p. 237; McKee, 1966, p. 102). Some think it is the method of teaching reading (Hay and Wingo, 1948), while others believe it should be one facet in word identification. Most people would agree with Russell's (1961) statements concerning the advantages and disadvantages of the phonics method of teaching reading.

He says:

The advantages and disadvantages of the phonics method may be summarized by saying that there is no superiority in the phonics method, when used as the sole or principal method of teaching, over other methods. However, it may have values in combination with other methods, particularly for certain pupils who seem to respond readily to auditory clues. For teachers the important point is not phonics versus no phonics but the extent to which it should be used and the methods and materials employed by the pupils in phonetic-analysis activities. The question is not how phonics can be crammed into early reading, but how it can be used by varied learners in different reading situations. Accordingly, some contrasts in timing and procedures and some principles for the use of phonetic analysis in the reading program are important in teacher and curriculum planning (pp. 304-305).

According to Heilman (1968, p. 53) the vowels are the most difficult part of phonics instruction. This is

due to the great variability in sound that a vowel or vowel combination may represent in different words.

Generalizations concerning vowels are taught to assist children in identifying words. Anderson (1968) states that a few of these "rules can give only slightly dependable guidance (p. 193)." She lists the vowel rules most commonly used as:

- (1) A single vowel within a three- or four-letter word is usually short.
- (2) An e at the end of a short word makes the vowel within the word long, and the final e is silent.
- (3) When two vowels appear together in a short word, the first is long and the second is silent (Anderson, 1968, pp. 193-194).

Yet vowel generalizations continue to be presented in current basal reading publications.

Authorities within the reading field are not in agreement concerning the role of phonic generalizations and how they should be taught. DeBoer and Dallman (1964, p. 96) suggest that generalizations should be developed inductively. This involves presenting familiar words which have similar letters. The similarity is called to the attention of the pupils, enabling them to form a generalization. At the beginning of phonic instruction, Durkin (1970, p. 261) stresses the inductive approach. Once the child has developed an understanding of letter-sound associations, she suggests switching to a deductive approach for the sake of efficiency. In this latter

approach the generalization is given and the pupil finds appropriate examples. Heilman (1968) stipulates that simply knowing phonic generalizations does not ensure application of these by all children. He says, "at best, phonic generalizations are a crutch which may have utility at certain points on the learning continuum (p. 23)." Also Spache and Spache (1969, p. 397) strongly suggest that dependence upon generalizations is not necessary for effective teaching of phonics.

Thus confusion results as the authors of basal reading series stress the teaching of phonic generalizations, while some authorities on reading instruction disagree. Burmeister (1968a) says that "although most educators today favor the teaching of phonic generalizations, very few of them are able to enumerate with any degree of certainty the generalizations which are worthy of being taught (p.349)."

Research, conducted through classroom experimentation, is necessary to determine the usefulness of phonic generalizations to children (Bailey, 1967, pp. 417-418). It is anticipated that this study may provide some answers to the question of usefulness of vowel generalizations to children in reading.

II. PURPOSE OF THE STUDY

The purpose of this study is to determine if there is a significant relationship between grade four pupils' ability to recognize vowel phonic generalizations when presented inductively and deductively and their ability to apply these generalizations in written and oral materials when tested by an instrument devised by the investigator.

III. DEFINITION OF TERMS

Phonics -- speech sounds corresponding to letters, letter groups, and syllables in words (Hildreth, 1958, p. 143).

Phonic generalization -- a comprehensive statement that can be formulated about attaching a speech sound to a certain letter or group of letters (adapted from Fagan, 1965, p. 3).

Utility of phonic generalizations -- the "utility level", or percent of utility of a generalization is computed by dividing the total number of instances in which the generalization under consideration is followed in the sample material by the total number of instances in which it could be expected to be followed (Burmeister, 1966, p. 1).

Vowel generalization -- a statement of a fundamental relationship between certain visual clues which characterize one type of vowel situation in a word and the quality of the

sound to be associated with the vowel letter in that word or syllable (Affleck, 1967, p. 8).

Short vowel -- refers to the generalization, "a vowel in the middle of a word usually has a short sound".

Long vowel -- refers to the generalization, "a vowel at the end of a word usually has a long sound".

Vowel digraph -- refers to the generalization, "if two vowels are together, the first sound is long and the second is silent".

r controller -- refers to the generalization, "if a vowel is followed by r, the vowel has neither a long nor short sound".

Final e -- refers to the generalization, "if there is a letter e at the end of the word, the first vowel sound is long".

Inductive approach -- employs known words to help children discover the various phonic generalizations. In each instance, words are selected which have one feature in common. It is about this that the generalization makes a statement which can subsequently be used to figure out unfamiliar words (Durkin, 1970, p. 260).

Deductive approach -- the direct teaching of generalizations which describe the sound of individual letters and letter combinations. Once these are learned, children are taught to apply the generalizations to words which are not yet in their reading vocabulary ... it moves

from generalizations to specific applications (Durkin, 1970, p. 259).

Sight words -- words that a child recognizes at once without deciphering the parts (DeBoer and Dallman, 1964, p. 84).

Nonsense words -- these are letter units, not forming an English word (adapted from Underwood, 1949, p. 632).

IV. HYPOTHESES

The following hypotheses have been formulated and are tested in this study:

- (1) There is no significant difference between the performance of pupils when evaluated inductively on section A of the vowel generalizations test and their performance on the written application form (section C), controlling for intelligence.
- (2) There is no significant difference between the performance of pupils when evaluated inductively on section A of the vowel generalizations test and their performance on the oral application form (section D), controlling for intelligence.
- (3) There is no significant difference between the performance of pupils when evaluated

deductively on section B of the vowel generalizations test and their performance on the written application form (section C), controlling for intelligence.

- (4) There is no significant difference between the performance of pupils when evaluated deductively on section B of the vowel generalizations test and their performance on the oral application form (section D), controlling for intelligence.
- (5) There is no significant difference between the means on each of the five types of generalizations within each section of the vowel generalizations test.
- (6) There is no significant difference between the scores attained by boys and girls on each section of the vowel generalizations test.
- (7) There is no significant difference between good and poor readers on each section of the vowel generalizations test when intelligence is controlled.

V. DESIGN OF THE STUDY

An elementary consultant from the Edmonton Public Schools designated ten middle class schools with grade four pupils on the six year program. From these, five were

selected by the investigator which had been given the California Reading Test. A total of 146 children comprised the sample.

A group test of forty-five items and an individual test of fifteen items concerning vowel generalizations was administered to each subject. The test, which examined five vowel generalizations, was constructed by the investigator specifically for this purpose. The results of the testings together with the information collected from the cumulative record cards were recorded on computer cards. Statistical analyses, by means of a one-way analysis of variance and a one-way analysis of covariance, was performed. z scores were calculated using a test of the significance of the difference between two proportions for correlated samples. Informal analysis of errors on the oral reading section was also undertaken.

VI. LIMITATIONS OF THE STUDY

The study is limited in the following ways:

(1) Since vowel generalizations were tested, implications could not be stated concerning consonants.

(2) Each pupil has had four or more teachers.

Although vowel generalizations are outlined in the basal reading series, the investigator was unable to ascertain how the generalizations were taught and how much emphasis was placed on them.

(3) It was recognized that stating a generalization specifically would give clues to help the child recognize 'words'. The study was designed to overcome this feature but it may exist in some form.

(4) The use of nonsense words possibly was disturbing to some of the children.

VII. SIGNIFICANCE OF THE STUDY

Confusion exists concerning the methodology and utility of phonic generalizations. Recent research studies have indicated that the role of phonic generalizations in word recognition is somewhat questionable (Burrows and Lourie, 1963; Clymer, 1963; Bailey, 1967; Emans, 1967).

This study, then, is designed to investigate if there is a significant relationship existing between the child's ability to recognize certain phonic generalizations as they pertain to vowels, and his ability to apply these to his tasks in word recognition. It is anticipated that this study will help teachers in their instruction of phonic generalizations. Possibly different approaches in teaching generalizations will be apparent. Perhaps the question as to whether it is helpful for children to know about generalizations will be answered.

VIII. PLAN OF THE RESEARCH

In Chapter I the problem was identified and the study was outlined. The results of previous research studies and literature, related to the problem are presented in Chapter II. Chapter III describes the sample, the testing instruments and procedures and the statistical procedures. The results of the statistical analyses of the data and their interpretation are presented in Chapter IV. Chapter V contains the conclusions based on the findings and the implications for further research.

CHAPTER II

REVIEW OF THE LITERATURE

The review of the research is organized into four sections. The first section deals with the role of generalizations in learning. The second part examines the relationship of phonic generalizations and reading. In the third section, a discussion of the history of phonic instruction and generalizations is presented; the final section presents a review of the studies related to phonic generalizations.

I. THE ROLE OF GENERALIZATIONS

It is important to understand the role of generalizations in learning. DeCecco (1968, p. 259) observes that a child upon confronting a new stimulus will sometimes make a response he has previously learned to make to another stimulus. He defines this as generalizing. DeCecco (1968) states that "if we could not generalize, we would have to learn discrete responses for each discrete stimulus, and our behavior would appear to be something less than human (p. 259)." Stephens (1965, p. 217) stresses the necessity of the generalization to be grasped in order for it to prove useful in transfer. Gagné (1965, p. 135) notes that once a concept is learned, the individual is able to generalize this concept to other different stimuli which

were not present during the learning period. According to Vinacke (1952),

... generalization signifies that the dominant detail (or group of details) resulting from abstraction is used as a basis for responding similarly to the separate objects linked by abstraction, and for responding to other objects similarly linked (p. 104).

Thus the learning of generalizations equips the individual with broad patterns rather than one to one relationships. The question then arises as to how this type of learning relates to reading.

II. THE RELATIONSHIP OF PHONIC GENERALIZATIONS

AND READING

"Phonic analysis, or phonics, has as its goal the identification of written words through and analysis of the letters comprising them (Durkin, 1970, p. 233)."

Phonics is just one of several basic word recognition techniques. Heilman (1968, pp. 4-6) lists the various approaches used in word analysis as word form, structural analysis, context clues, picture clues and phonic analysis. According to Anderson (1968),

Phonics is not an end in itself; it is only one of five word recognition techniques in reading used most effectively with the context clue to assist children in decoding words quickly and easily with the thought of the complete sentence foremost in the child's mind (p. 201).

To aid the child in learning sounds, most basal programs try to lead him inductively to recognize basic

generalizations which will assist him in recognizing sounds in unfamiliar words (Spache and Spache, 1969, p. 389). Durkin (1970, p. 234) points out that problems arise in phonics as there is not a perfect correspondence between letter and sound. She cites examples such as homonyms and silent letters which tend to be confusing. Durkin (1970, p. 234) suggests that irregular spellings and inconsistent use of letters does not eliminate using letter-sound relationships in helping a child to read. It is important to remember that phonic rules are not infallible. Rather they

simply make use of observations that have been made about the way the whole of our language is recorded. These observations or generalizations point to some patterning; they also reveal inconsistencies, although some of the apparent inconsistencies follow certain patterns too (Durkin, 1970, p. 234).

The context of phonics is comprised of these various generalizations. Unfortunately the exceptions to each of these generalizations often confuse the child resulting in considerable debate concerning their value (Spache and Spache, 1969, p. 389).

In order to place phonics in its proper perspective the history of this type of instruction will be outlined.

III. HISTORY OF PHONIC INSTRUCTION

Historically there has been much controversy centered around the teaching of phonics. Although there has been a

tendency to discard phonic instruction at times, it has been re-introduced later, each time in a revised and modified form (Emans, 1968, p. 602).

Nila Banton Smith (1965) gives descriptions and approximate dates for the duration of each period in which phonic instruction assumed special significance on the North American continent. Phonics was introduced during 1776-1840. The child was drilled on the sounds of individual letters. This approach was abandoned when it was advocated that the meanings of words rather than their sounds be taught, and the word method was employed. As it is difficult to learn all words by sight, dissatisfaction arose concerning the word method approach and phonics was re-introduced from 1880-1920. The phonic method of this era shifted to an emphasis on groups of letters, often called word families, such as, ill, am, ick, ate, old, and ack. Reading was again reduced to mechanical drills. With new emphasis placed on silent reading and with the impact of research concerning phonics, a reaction against phonics again occurred in the 1920's. The word method approach was again employed. Once more this did not solve the reading difficulties. Studies by Winch (1925), Gates and Russell (1938), Agnew (1939) and Tiffin and McKinnis (1940) supported the teaching of phonics and led to its being favorably re-examined. During 1935 to 1955 phonics came back supplemented with picture clues, context clues,

structural analysis and dictionary skills. In the newer approach, the word was observed as a whole, then the parts were seen as components of the whole. This was termed the analytic approach.

Today phonics is taught by most elementary teachers (Emans, 1968, p. 606). Austin and Morrison (1963, p. 28) surveyed the opinions of twenty-eight reading authorities who generally agreed that phonics is one of the essential skills that help children identify printed words. They also stated, "Each of the basal reading series currently in use in the schools included in this study introduces phonic elements and teaches certain phonic principles and their application (1963, p. 30)."

Modern phonic programs attempt to provide comprehensive and varied work attack skills which include attention to configuration clues, meaning, structural analysis and phonics (Harris, 1961, p. 325).

Controversy still exists concerning phonics. Austin and Morrison (1963) summarize the state of phonics today when they say:

The question, then, as to the importance of phonics or its utilization in the classroom cannot be considered controversial. Reading authorities agree on its importance, and school officials attest its universal adoption. Any bona fide controversy must be elsewhere, and in this instance it is to be found in the approaches used to teach phonics and in the program of instruction which accompanies each approach (p. 28).

History of Phonic Generalizations

Early studies on phonic content stressed the need to teach the long and short sounds of vowels but only a few suggested the teaching of vowel rules. Vogel et al (1923), Cordts and McBroom (1928) and Gillingham and Stillman (1936) suggested teaching the rule for lengthening the vowel sound before the final e. In a 4,065 word basic spelling vocabulary, Sartorius (1931) found examples and exceptions to this rule at both the grade one and two levels.

Gillingham and Stillman (1936) advocated teaching the rule that a vowel is usually long when it stands at the end of a monosyllable or an accented syllable. Cordts and McBroom (1928) recommended teaching this rule as well as a rule for short vowels, which stated that when there is one vowel in a syllable and it is not at the end of the syllable, the vowel is short except when it is followed by r or l or preceded by w.

Although reports of phonic investigation suggested rules, other research indicated the limitations of the utility of these. Spache (1939) questioned the lack of evidence of the frequency of their appearance. The variability in the sounds which letters symbolized was also pointed out by several investigations. Atkins (1926) found that very few letters stood for one sound. Only 805 of the 1,600 one-syllable words which Cordts (1926)

classified could be taught according to phonic principles. Horn (1929), basing his work on Cordts' study, determined forty-seven different ways of symbolizing the short sound-letter association for the vowel a. Satorious' (1931) study found that the average two-letter combination had six different pronunciations. Agnew's (1939) review of studies concerning phonics found generally that researchers agreed concerning the non-phonetic nature of the English language and they cautioned teachers concerning the exceptions to phonic rules.

In some of the readers published in the early 1900's, phonic rules made their appearance. The preface to the Beacon Primer (1912) states,

Besides the consonants and the short sounds of the vowels, there are but few phonetic rules which the pupil needs to learn before recognizing the majority of English words. These rules, when brought to his understanding through practice on long lists of selected words where only one difficulty is presented at a time, quickly and surely develop the reading power (Gray, 1948, p. 14).

The Moore-Wilson Readers (1927) called the vowels "fairies". The long sounds were their names and the short sounds their nicknames. Fairy rules were given for determining which vowel sound should be used (Gray, 1948, pp. 22-23).

It was not until the latter half of the 1930's that phonic generalizations appeared in the manuals of the new basal reading series (Affleck, 1967, p. 27). This practice has continued to the present time. Cordts (1965) states,

"Rules for pronunciation and syllabication are included in the teachers' manuals and their application is provided for in the childrens' workbooks that accompany the basic readers (p. 228)."

IV. RESEARCH CONCERNING PHONIC GENERALIZATIONS

Studies have been conducted using a utility level or frequency approach to determine the usefulness of phonic generalizations. These can be divided into general studies concerning all phonic generalizations and research dealing specifically with vowel generalizations. Research has also been reported pertaining to children and their ability to work with generalizations.

General Studies

In 1952, Oaks (as reported by Affleck, 1967) analyzed the vowel situation in words occurring in the primer through third grade materials in fourteen basal reader series which were published between 1932-1936. The study was limited to the base forms of the words used in the Betts primary reading vocabulary studies. A total of 1,966 words were examined. The sounds given vowels were those in the re-spelling in the Webster's New International Dictionary.

The procedure used to obtain the data consisted of four steps involving the identification of the words to be analyzed at each reader level, the identification of the

markings of the vowels, the identification of the phonic principles and the other factors which influence the pronunciation of the vowels such as silent vowel letters and unstressed syllables.

Oaks concludes that vowel situations should be introduced in a phonic program in the following sequence: at the primer level, the "short" vowel should be introduced; at the first reader level, the remaining short vowels, and e before r, as in mother, should be given; at the second reader level, "long" vowels, "silent" vowels, vowel a before r as in arm, diphthongs, and a group of nine unclassified vowel letters with varied diacritical markings could be presented, and at the third reader level, additional "long" vowels, "silent" vowels, vowels before r, and one new unclassified vowel letter should be included.

Oaks presents eight principles that apply often enough in vowel situations to merit their being taught. In her study, the eight rules were applicable in only about 50 percent of the total vowel situations. Following are the vowel situations embraced by these eight principles:

- (1) A syllable containing more than one vowel letter and ending in e.
- (2) An open, accented syllable.
- (3) A closed, accented syllable.
- (4) A final syllable in a word ending in y.
- (5) A syllable containing the letter a before the letters l or w.
- (6) A syllable containing a vowel digraph.
- (7) A final syllable ending in the letters le.
- (8) A final syllable ending in the letters en.

(Affleck, 1967, p. 37).

A study by Clymer (1963) tested the percentage of cases in which various rules on phonic generalizations actually applied in words met in four basal series (grades 1-3), plus the words on the Gates Primary Reading Vocabulary (not found in the Basals). Some twenty-six hundred words constituted the sample. Of the 121 different statements located in these programs a selection of forty-five of these generalizations was made on the basis of whether or not the statement was specific enough to provide aid as a clue to the pronunciation of a particular word. The generalizations were then applied to the words to determine what percentage of the words followed the rule and what percentage were exceptions.

Clymer suggested that two criteria be met in order for a rule to be classified as useful. First, the situation covered by a rule must occur in a minimum of twenty words found in the twenty-six hundred word sample; second, the rule should apply in at least 75 percent of the cases it was designed to cover. Of the forty-five phonic generalizations considered in the study, twenty-three covered vowel situations. In adhering to the specified criteria it was found that only eighteen generalizations are useful. Clymer concluded that many generalizations which are commonly taught are of limited value.

Bailey (1967) and Emans (1967) partially replicated Clymer's study. Both studied the same forty-five

generalizations as Clymer. Bailey used as her source of words the entire vocabularies of all textbooks, grades one to six, of eight basal reading series which she specifies. Only words that appeared in two or more of the eight series were included, and place names, proper names, and foreign words were excluded. A composite list of 5,773 words resulted. Computers were used for the identification of all words in the composite word list to which each of the forty-five generalizations applied. Webster's New Collegiate Dictionary determined the conformations and exceptions to each generalization. The results indicated that the utility of the forty-five generalizations ranged from 11 percent in one case to 100 percent in eight instances. She concluded that only six generalizations were valid in terms of ease and breadth of application with minimal exceptions. Following are the phonic principles which were considered valid:

- (1) When c and h are next to each other, they make only one sound.
- (2) When c is followed by o or a, the sound of k is Likely to be heard.
- (3) When c is followed by e or i, the sound of s is Likely to be heard.
- (4) When two of the same consonants are side by side, only one is heard.
- (5) In most two syllable words that end in a consonant followed by y, the first syllable is accented and the last is unaccented.
- (6) If the last syllable of a word ends in le, the consonant preceding the le usually begins the last syllable (Bailey, 1967, pp. 416-417).

Emans (1967) applied Clymer's generalizations to a random sample of 1,994 words beyond the primary level in The Teacher's Word Book of 30,000 Words by Thorndike and Lorge. As in Clymer's study, Webster's New Collegiate Dictionary was used to verify the spellings, phonetic re-spellings, and syllabic divisions of words. Clymer's criteria that there must be a minimum of twenty words to which the generalization applies plus a utility percentage of at least 75 was employed. Emans went further than Clymer differentiating between primary and secondary generalizations. Primary generalizations are those which tend to be encompassing, such as, "When there are two vowels side by side, the long sound of the first one is heard and the second is usually silent". Secondary generalizations are explanations for the exceptions to other generalizations. In reference to the generalization previously stated a secondary generalization would be, "In the phonogram ie, the i is silent and the e has a long sound".

Emans found that sixteen generalizations met the criteria as compared to Clymer's eighteen. There was found to be a difference between the two studies concerning eight generalizations. Emans mentions that generalizations other than the forty-five selected by Clymer may be useful. Also the re-wording of generalizations was suggested.

The relative effectiveness of inductive and deductive approaches to the instruction of word analysis tasks was

studied by Burmeister (1966). Eighth and ninth graders of average ability, but who exhibited weakness in word analysis skills, were presented with phonic and structural analysis generalizations applicable to the pronunciation of words above the primary level of difficulty. In an attempt to obtain an even spread of easy and difficult words, she chose her sample from The Teacher's Word Book of 30,000 Words by Thorndike and Lorge at fourteen different "frequency of occurrence" levels. She took a 5 percent random sample at each of eleven levels for words which occur from six to over one hundred times per million running words. She looked at generalizations which are frequently found in materials at the fourth grade level and above and also at generalizations which she had formulated through her own teaching experience. Criteria used in the selection of the generalizations to be taught were: (a) the need of the students who were to be taught, and (b) approximately 90 percent utility level. She tripled the number of sample words for her analysis of adjacent (double and triple) vowels and inductively arrived at generalizations which describe the sounds of such vowels. For the authority on pronunciation, she used The American College Dictionary (1961). Results indicated that both experimental groups, inductive and deductive differed on total mean scores from the control group. The experimental groups were superior in oral reading but not in silent

reading.

Fry's (1964) frequency count is based on his three hundred "Instant Words" (1960) and on comparisons made with findings by Moore (1951), Cordts (1925), Black (1961) and Kottmeyer (1954). He looked at twenty-one phonic rules which were formulated from his own experiences in a reading clinic situation. The phonemic system he used was taken from Moore, which was based on work by Bloomfield. The rules were ranked according to their frequency of use as determined by Moore's frequency count of three thousand common English words. Fry stresses the necessity of "data" articles concerning phonics rather than "opinion" articles. Fry concluded that while there were some deviations, it was confirmed that the rules do apply even to beginning reading materials. A teaching order for the phonic rules was also presented.

The utility of phonic generalizations in four selected basal reading series was examined by Maresh (1969). A composite list of words and generalizations were compiled from the materials grades one to three. The Thorndike-Barnhart Dictionary and the Webster's Elementary Dictionary were used as two separate sources for pronunciation. The percentage of utility for each generalization was calculated and then a comparison of the percentage of utility of generalizations within each series and among the four series was made. A 70 percent minimum of utility of phonic

generalizations was arbitrarily set by the researcher.

Maresh concluded that three of the four series, the American Book Company Series, the Ginn and Company Series, and the Allyn and Bacon Incorporated Series fell short of the minimum as their generalizations were too broad. This resulted in many exceptions being included in the list. The Scott, Foresman and Company Series met the minimum standard of 70 percent. A higher percentage of utility resulted when the Thorndike-Barnhart Dictionary was used instead of the Webster's Elementary Dictionary as reference for proper pronunciation. Maresh suggested that generalizations need to be re-worded and reorganized in order to be more useful.

Vowel Generalizations

Affleck (1967) determined the utility of six vowel generalizations when these were applied to words ordinarily encountered in reading at the intermediate grade levels.

Four criteria were determined for selecting and stating the vowel principles to be tested. These criteria required that the principles be applicable to any vowel letter but to only one vowel situation which was described clearly within the principle in terms of the type of syllable to which it applied, the number of letters used, and the position of the vowel in the syllable with reference both to its placement as well as its relation to other

letters in the syllable. The vocabulary selected for testing these principles was the first six thousand words in The Teacher's Word Book of 30,000 Words by Thorndike and Lorge. The words were then checked by using the Thorndike-Barnhart Beginning Dictionary and the Thorndike-Barnhart Junior Dictionary. A 75 percent utility suggested by Clymer was used. The frequency of occurrence of each vowel situation and the percentages of utility were computed for each principle. The vocabulary was divided into primary (first two thousand words) and intermediate (third to sixth thousand words) lists as well as a combined list. This enabled the researcher to make comparisons between the usefulness of generalizations to primary and intermediate grades. A sequence for teaching of vowel principles was presented.

Affleck concluded that within the stated limitations of the study, percentages of utility for vowel principles were generally higher than those reported in previous studies. Also the vowel principles had at least as high utility for intermediate grade levels as for a primary grade vocabulary.

Burrows and Lourie (1963) report a study of the frequency with which one widely taught vowel rule applied to the five thousand highest frequency words on the Rinsland List. The rule under discussion states "when there are two adjacent vowels in a word, the first usually has its long sound and the second is silent". Children are often taught

this rule as, "when two vowels go out walking, the first one does the talking". In the five thousand word sample a total of 1,728 words met the two-vowel criterion. Webster's New Collegiate Dictionary was used to check the pronunciation. Of the 1,728 words found to contain two adjacent vowels, including the five common vowel letters and y and w, only 668 of these words followed the principle in that the long sound of the first vowel was pronounced and the second letter was a "silent" one.

In this analysis, the following data relating to specific letter combinations in subgroupings were reported. The largest subgroup of words was that containing the ea combination which totalled 268 words. One hundred and fifty-seven or approximately 60 percent of these followed the rule. In the letter combination ai the rule applied to 103 of 139 words or to approximately 75 percent. Of the 122 words containing ie vowel combination, only twenty-nine words, or approximately 25 percent, followed the rule. This vowel combination contained twelve words in which each vowel was pronounced separately as in diet. The ia combination also occurred in many words where both vowels were pronounced. Because these researchers were considering this "two-vowels-together" principle for use by children in the early grades, it was not assumed that the children would recognize as exceptions the six diphthongs, oy, ow, oi, ou, ew, and ue. When the 389 words containing these, together with the

forty-nine words containing three adjacent vowels, were cast out of the list of five thousand there remained 1,399 words with two adjacent vowels that were not diphthongs.

When the above 438 exceptions were removed from the previous total of 1,728 words the new total was 1,290 and the percentage computed for the 668 words in which the long sound dominates became slightly over 50 percent. Burrows and Lourie conclude that the most substantial help a beginning reader can gain from the analysis of new words is the knowledge the vowel sounds vary and that the greatest help comes from consonants and context.

Burmeister (1968b) submitted this "vowel-pair" generalization which Burrows and Lourie (1963) studied to a linguistic examination. The author wanted to determine: (a) what specific phoneme (or phonemes) does each "vowel-vowel" grapheme represent, (b) is it possible to group several vowel-pair graphemes according to similar patterns in their phoneme behavior and (c) which vowel-pairs fit in each group. A total of 17,310 words were examined by using a computer. Part I of the Thorndike-Lorge Teacher's Word Book of 30,000 Words plus 2,026 words selected from the Merriam-Webster's New Collegiate Dictionary, sixth edition, comprised the list which Hanna, Hanna, Hodges and Rudorf used in their study in 1966 published in a volume titled Phoneme-Grapheme Correspondences as Cures to Spelling Improvement. The grapheme-phoneme relationship for each

possible vowel-pair in the English language was examined. Vowel-pairs were grouped according to each pair's most common sound. Any which occurred less than fifty times were deleted as the author considered a generalization covering it would be of little value. The vowel-pairs were viewed in two different ways: (1) single phoneme percentages for each grapheme, and (2) the frequency of occurrence of each phoneme for each grapheme. Percentages show the proportional value of each phoneme for each grapheme whereas frequencies will demonstrate the actual number value of each phoneme, both in relationship to its grapheme and to the total sample.

Burmeister concluded that the sounds for vowel-pairs tended to fall into four categories: (1) the first vowel dominates which is usually true for ai, ay, ea, ee, oa and ow. This is the common "two vowels together" generalization, (2) two vowels blend which is usually true for au, aw, oi, ly and oo, (3) a new sound results -- ou = e, ey = i, ew = u and ei = a, and (4) the vowel pairs may separate, that is the vowel-pair forms two phonemes.

She stresses the vowel digraph generalization has limited usefulness. This study suggests: (1) the second most common sounds of ea and ow should be taught, (2) au, aw, oi and oy as diphthongs and the two sounds of oo should continue being taught and (3) the teaching of the various sounds of ei and ie is questionable.

Burmeister (1969) also linguistically examined the vowel generalization, "when a word ends in a vowel-consonant-e, the e is silent, and the vowel has its own long sound", for example, hate. A total of 2,715 common English words were taken from the Hanna, et al (1966) publication. When the vowel was defined as a single-vowel, the consonant as a single-consonant, and the final e as a single e, for example, hate as opposed to caste, the generalization was found to be highly useful, although this conflicts with other recent findings (Clymer, 1963; Bailey, 1967; Emans, 1967). Burmeister examined the grapheme-phoneme relationship and classified those sounds which each of the single-vowel graphemes represented.

Using the total sample of 2,715 words the utility level of this generalization was 73.7 percent. For a, e, i, o, u and y, it reached the utility levels of 78.9, 67.4, 61.1, 85.6, 78.3 and 100 percent, respectively. The group which composed the three largest exceptions were: (1) a-e = i (as in furnace, damage and private), (2) e-e = a (as in there), and (3) i-e = i (as in live and captive). Burmeister recommended that primary level words which are exceptions to the generalizations should be taught as sight words at the primary level and that groups of exceptions be taught at a later time as the need arises in reading materials. She concluded that the rule as stated is satisfactory for use in a phonic program.

Phonic Generalizations and Children

In 1965, Fagan tested the phonic knowledge of grade three and grade seven pupils. He attempted to determine the degree to which these pupils used this knowledge in pronouncing words in an oral reading situation. Thirty-six pupils from each grade level were divided into groups of high, average and low reading achievers. These in turn were grouped according to sex. A modified Boyd Test of Phonetic Skills was administered to determine phonic knowledge. To measure the application of this phonic knowledge, Fagan designed and administered separate individual oral reading tests.

He concluded that grade seven pupils acquired a significantly greater amount of phonic knowledge than did the grade three pupils. However, the correlation between phonic and reading scores showed a higher relationship between corresponding sections of the phonics and reading test using the grade three sample in comparison with the grade seven sample. In applying phonic knowledge, the low readers made a greater effort than the other groups and the boys were better than the girls.

Hillerich's (1967) study compared the skill of pupils who had been taught vowel generalizations with the skill of pupils who had no direct teaching about vowels. The performance on a thirty item nonsense syllable test and on a reading achievement test was compared for 742 grade one pupils

in ten classrooms in two school districts. The two systems were similar suburban districts, comparable in socioeconomic level, intelligence of pupils, class size and school expenditure per pupil. One group had received instruction in vowel generalizations using the Scott, Foresman basal series plus the Economy Press program, while the other group used the Houghton Mifflin program which does not teach vowel generalizations in grade one.

All pupils were administered Level 1 of Primary Reading Profiles by the classroom teacher. The nonsense test which included fifteen vowel sounds ranging from one to five samples was given by the investigator to avoid variations in pronunciation.

To check validity of the group administration, a reading form of the vowel test was given individually to fifty-nine pupils in three classrooms before the group testing. These scores were lower than the group test. A correlation coefficient of .63 suggests the two tests measured relatively the same skill.

A sample was taken from the total group that represented the highest and the lowest class in reading achievement from each district. Scores on the vowel test were correlated with scores in reading achievement for the seventy-six pupils in these four classes who had taken both tests. A correlation coefficient of .72 suggests that there is a relationship between the scores on the vowel test

and the reading achievement scores.

The results indicated that the subjects who had been taught generalizations were significantly superior in performance on the vowel test (t-test, $p < .01$). However, the subjects not receiving this instruction were found to be significantly superior on total reading ability as measured by the Primary Reading Profiles (t-test, $p < .25$).

Summary

The problems of a utility level or frequency approach are twofold: (1) the applicability or validity of a generalization, and (2) the usability of a generalization by pupils in reading situations. Before a generalization can be specified as useful both aspects of the above problem should be considered. The general studies and research concerning vowel generalizations have only considered the first aspect of the problem. Fagan's and Hillerich's investigations dealt with the second phase of the problem.

Variations in the findings of the research concerning the general studies and the vowel generalizations studies might be expected due to the following factors:

- (1) different ways used to determine usefulness;
- (2) different types of materials from which the sample words were taken;

- (3) different methods of selecting the sample words;
- (4) different "authorities" used to establish pronunciation.

These variations are outlined in Table I.

Word lists and basal readers have been used as sources. It appears that the wording of the generalization plays a significant role in its effectiveness. Unfortunately there is a lack of scientifically-evolved or widely-accepted criteria for judging usefulness of phonic generalizations. The sources used to establish the accepted pronunciation produce a difference in utility making comparisons rather difficult.

Often word lists have been analyzed without attempts to relate the results to the phonic aspect of the word recognition program. Some studies have presented sequential teaching outlines or made suggestions for teaching.

The results of Fagan's and Hillerich's studies are outlined in Table II as their procedures differed from the other investigations. Their research was concerned with childrens' ability to apply knowledge of phonic generalizations.

The majority of studies have examined phonic generalizations in isolation from childrens' ability to apply these generalizations in reading. It is hoped that this study may add more information in this area.

TABLE I
STUDIES CONCERNING PHONIC GENERALIZATIONS*

Researcher and year of the study	Method used to determine usefulness	Types of materials used to obtain the sample	Method of selecting sample and the total number of words used	Authorities used to establish the correct pronunciation
Oaks (1952)	utility level 47 %	10-14 reading series published in 1932-36 grades 1-3	base forms of Betts primary reading vocabulary -- 1,966 words	<u>Webster's New International Dictionary</u>
Clymer (1963)	utility level 75 %	4 basal series, grades 1-3, plus words from Gates Reading Vocabulary Primary List	composite list of all the words in these series and list -- 2,600 words	<u>Webster's New Collegiate Dictionary</u>
Bailey (1967)	utility level 75 %	8 basal series, grades 1-6	words that appeared in two or more series proper names and foreign names omitted	<u>Webster's New Collegiate Dictionary</u>
Emans (1967)	utility level 75 %	intermediate words in <u>The Teachers' Word Book of 30,000 Words</u> by Thorndike and Lorge	random sample of 10 % of the words -- 1,944 words	<u>Webster's New Collegiate Dictionary</u>
Burmeister (1966)	frequency and utility level 90 %	<u>The Teachers' Word Book of 30,000 Words</u> by Thorndike and Lorge	5 % random sample of 11 levels for words occurring 6 or over 100 times per million running words	<u>The American College Dictionary</u>
Fry (1964)	frequency approach	Fry's 300 Instant Words	compared with the findings of Moore (1951), Cordts (1925), Black (1961), Kottmeyer (1954)	phonemic system from Moore, based on Bloomfield's work
Maresh (1969)	utility level 70 %	4 basal series, grades 1-3	composite list of all the words in the four series	<u>Thorndike-Barnhart Dictionary and Webster's Elementary Dictionary</u>
Affleck (1967)	utility level 75 %	<u>The Teachers' Word Book of 30,000 Words</u> by Thorndike and Lorge	first 6,000 words from Thorndike-Lorge list	<u>Thorndike-Barnhart Beginning and Junior Dictionaries</u>
Burrows and Lourie (1963)	frequency approach	Rinsland list of basic vocabulary	analyzed 5,000 words of highest frequency -- 1,728 words	<u>Webster's New Collegiate Dictionary</u>
Burmeister (1968)	frequency and utility level	<u>The Teachers' Word Book of 30,000 Words</u> by Thorndike and Lorge and Merriam Webster's New Collegiate Dictionary	15,284 words from the Thorndike-Lorge list plus 2,026 words from the dictionary -- total of 17,310 words	used reverse procedure of Hanna, <i>et al</i> -- grapheme-phoneme relationship
Burmeister (1969)	frequency and utility level	<u>The Teachers' Word Book of 30,000 Words</u> by Thorndike and Lorge and Merriam Webster's New Collegiate Dictionary	2,715 words that applied from the composite list of 17,310 words	used reverse procedure of Hanna, <i>et al</i> -- grapheme-phoneme relationship of the single-vowel graphemes

* in the order of appearance in Chapter II.

TABLE II

STUDIES CONCERNING PHONIC GENERALIZATIONS AND CHILDREN

Researcher and year of the study	Purpose of the study	Grade level	Number in the sample	Instruments used	Conclusions
Fagan (1965)	To test knowledge of phonic principles and to determine if pupils applied this knowledge in oral reading material.	3 and 7	72	- <u>Boyd Test of Phonetic Skills</u> - <u>Oral Reading Tests</u>	Grade 7 acquired more phonic knowledge than grade 3. Low readers used phonic knowledge more than the other groups. Boys did better than girls.
Hillerich (1967)	To compare pupils who had been taught vowel generalizations with those who had not.	1	742	- <u>Thirty item Nonsense Syllable Test</u> - <u>Primary Reading Profiles</u>	Pupils taught vowel generalizations did better on the vowel test while those not receiving this instruction were better on total reading ability.

CHAPTER III

THE DESIGN OF THE STUDY

I. INTRODUCTION

The data on the recognition and application of vowel generalizations of grade four children were gathered from pupils in five Edmonton Public Schools in May, 1970. This chapter explains the choice of grade, the nature and selection of the sample, describes the experimental instruments, and the procedure followed in the collection of the data.

II. POPULATION AND SAMPLE

The sample selected for this study was chosen from a grade four population. This grade level was selected because most reading programs present instruction in vowel generalizations from grades one to three. The current year has provided them with a review of these generalizations.

As average grade four pupils were required for this study, in an attempt to ensure their ability to read and to give a wide range of scores, an elementary consultant of the Edmonton Public Schools designated ten large schools which would have complete grade four classes on the six year program. From this total of ten schools, five were selected which had given the California Reading Test,

Form X. Upon consultation with the principals of these five schools, the specific classes were chosen. There was a total of 146 grade four pupils on whom complete data (results of intelligence tests, and standardized reading achievement test scores) could be obtained.

III. MEASURING DEVICES

Results of the Canadian Lorge-Thorndike Intelligence Test and the California Reading Test, Form X were recorded from the cumulative record card of each subject. In order to control for the differences in intelligence when testing the hypotheses it was necessary to obtain the pupils' intelligence scores. A comparison of the performance of good readers and poor readers on each section of the vowel generalizations test required a performance score on a reading test. An analysis of the tests, test manuals, and critical reviews revealed the following information concerning each of these tests.

Canadian Lorge-Thorndike Intelligence Test

This test purports to measure "abstract intelligence" defined as "the ability to work with ideas and the relationships among ideas (Lorge et al, 1967, p. 5). The test provides both a Verbal and Non-verbal Battery. The Verbal Battery, which was used in this study, is composed of five subtests: vocabulary, verbal classification, sentence

completion, arithmetic reasoning, and verbal analogy.

Norms were standardized in 1966 on a population of 31,739 pupils in 229 schools in ten provinces and one territory. The procedure for securing norms for the test were designed to obtain a representative sample of English speaking pupils in grades 3-9 throughout Canada.

Odd-even reliability scores were .945 for the Verbal Battery.

As data for Canadian pupils had not been obtained, the results of correlations with similar forms of the Lorge-Thorndike Tests in the United States were reported which indicated that the tests correlated quite highly with other measures of intelligence. Correlations in the high 70's and low 80's were reported for the Verbal Battery with the Stanford Binet and with the WISC Verbal Scale. Similar correlations have been reported between the Lorge-Thorndike Verbal Battery and the Verbal Reasoning Abilities sections of the Differential Aptitude Tests.

Most reviewers tended to agree with Freeman that the Lorge-Thorndike Intelligence Test which is similar to the Canadian version "is among the best group tests available, from the point of view of the psychological constructs upon which it is based and that of statistical standardization" (Buros, 1959, p. 350).

California Reading Test

This test consists of a fifty word multiple-choice vocabulary test and seventy multiple-choice comprehension questions. In all cases there are three distractors and a correct response. The vocabulary section is divided into a general and three specialized vocabularies. The comprehension section is divided into three sections: (1) following directions, (2) reference skills, and (3) interpretations. Reliability coefficients were computed using the Kuder-Richardson formula 21 and yielded coefficients for the reading vocabulary of .91 and for the reading comprehension of .92. The two sections combined yielded a coefficient of .95. The standard error of measurement is given as 3.0 and 3.9 for the reading vocabulary and comprehension sections respectively. Construct validity was measured by correlation of the test results with those of a measure of mental maturity and school achievement. The correlation between this reading test and the California Test of Mental Maturity at the grade five level with two hundred subjects was .75 and .70 with the verbal and non-verbal mental age scores respectively. Correlation at the grade five level with ninety-nine subjects of the reading vocabulary section of the Metropolitan Achievement Tests, Elementary Form R, was reported as .95 and with the vocabulary section of the Stanford Achievement Test, Intermediate, Form J, as .83,

with 128 grade five subjects. Coefficients of correlation with the comprehension sections of the same tests and with the same samples were given as .83 and .85. Flanagan in reviewing this test said it was a valuable tool in measuring important vocabulary and comprehension skills but Hobson suggested that further reliability and validity studies would be valuable (Buros, 1953, p. 530).

Administration of Group Tests

The standardized tests, administered as part of a system-wide testing program were written by all pupils throughout the system at the same time. The Canadian Lorge-Thorndike Intelligence Test was administered in February of 1969, while the California Reading Test was written in April, 1970. Each of these tests was administered and scored according to the instructions set down in the test manual. Results were recorded on the cumulative record card of each student.

IV. CONSTRUCTION, ADMINISTRATION AND SCORING OF THE VOWEL GENERALIZATIONS TEST

In addition to the group tests described previously, a group test of forty-five items and an individual test of fifteen items concerning vowel generalizations, constructed specifically for this study by the investigator, was given to each subject. This test was designed to measure the

child's ability to recognize and apply vowel generalizations. Five vowel generalizations were selected for testing in four different sections. The test was constructed according to the following procedures.

Construction of the Vowel Generalizations Test

In considering possible phonic generalizations to test, vowel generalizations were chosen instead of consonant generalizations. The role of vowels is significant considering that five letters are used in English to indicate nine simple vowels, whereas twenty-one letters are used to indicate twenty-four consonants (Gleason, 1961, p. 17). Each of the vowels can occur alone, with /y/, with /w/, or with /H/, resulting in a total of thirty-six possible vowels (Gleason, 1961, p. 34). The role of consonants is rather stable whereas the vowels have many variations. This fact combined with the knowledge that the vowel is the nucleus of every syllable indicates its importance (Gleason, 1961, p. 28). Spache and Spache (1969, p. 388-389) stress the difficulty in teaching vowels due to their many variations and combinations. The role of vowel generalizations in aiding a child to pronounce words is important.

Vowel generalizations are outlined in the instructions for teachers in many current reading series such as Ginn Basic Readers (revised), The New Basic Readers, Language Experience Reading Program, The Harper and Row Basic Reading

Program, and The Macmillan Reading Program. The children receive instruction in these generalizations in the primary program while a review of these is carried out in the intermediate grades.

Authorities within the reading field enumerate various vowel generalizations which they consider beneficial to teach (Betts, 1957, pp. 634-635; Dawson and Bamman, 1963, p. 172; Dechant, 1964, pp. 284-286; Smith, 1963, p. 198).

The specific vowel generalizations selected for testing in this study were as follows:

- (1) When the vowel is in the middle of a word or syllable, it usually has a short sound.
Example: hid, tax, dug, but / ton, hol / low, chip / munk
- (2) When the vowel comes at the end of a one-syllable word or at the end of a syllable, it is usually long.
Example: go, be, cry, so / fa, fa / mous, mu / sic
- (3) When there are two vowels in a word and one of them is e at the end of the word, the first vowel is usually long.
Example: spoke, mine, chase, slope, time, bike
- (4) When two vowels come together, the first vowel is usually long; the second vowel is silent.
Example: afraid, paid, steam, braids, load, breathe

[Generalizations 1 - 4 (Schular, J.W., Workbook for Adventure Awaits, Fourth Reader, Toronto: Ginn and Company, pp. 11, 60; Gray, W.S., Monroe, M., Artley, A.S. et al., Guidebook to Accompany the New Times and Places, Toronto: W.J. Gage Limited, pp. 52-53.)]

- (5) If the only vowel letter in a word or syllable is followed by r, the sound of the vowel usually is controlled by the r sound.
Example: garbage, forty, store, term, bird, bury

(Gray, W.S., Monroe, M., Artley, A.S., et al.,
Guidebook to Accompany the New Times and Places,
Toronto: W.J. Gage Limited, p. 53; Russell,
D.H. and Wulffing, G., Manual for Teaching the
Third Reader-II, revised edition, Toronto:
Ginn and Company, pp. 209, 234, 272, 427.)

The vowel generalizations as stated above appeared to be too difficult to be read by grade four pupils. For the purposes of this study they were re-worded in order to make the terminology easier. These were then submitted to the reading professors of the Elementary Education Department for suggestions and approval. The generalizations were then adjusted to read as follows:

- (1) A vowel in the middle of a word usually has a short sound.
- (2) A vowel at the end of a word usually has a long sound.
- (3) If there is a letter e at the end of the word, the first vowel sound is long.
- (4) If two vowels are together, the first sound is long and the second is silent.
- (5) If a vowel is followed by r, the vowel has neither a long nor short sound.

In order to determine the childrens' ability to work with vowel generalizations, it was decided to use nonsense words as it was assumed that this would compel the pupil to analyze the word. The nonsense word method of testing important phonic skills has been endorsed by linguists (Ramsey and Harrod, 1969, p. 643). The use of real words was considered, but as it was impossible to ascertain which words were familiar to the children, and known as sight

words, this idea was eliminated. It was also noted that difficult unfamiliar real words possibly appear as nonsense words to the child. Using Dechant (1964, pp. 274, 280, 282, 284-286, 301, 302) who lists groups of words pertaining to each of the five vowel generalizations, lists of nonsense words were constructed for each category of generalization. This was done by altering the patterns of real words so that the structure was typically English but the words were actually nonsense words. In no case did the letter combination spell a real word, for example, chas, swo, blaip, dirsh and frike. As some words are exceptions to the generalizations, the construction of nonsense words enabled the investigator to ensure that each 'word' adhered to a rule being examined.

The test consisted of four sections. The first two pertained to the recognition of generalizations using the inductive and deductive approaches respectively, while the third and fourth sections consisted of the application of generalizations using written and oral approaches. It was felt desirable to have two application tests to determine if pupils performed differently when working with written and oral materials. The oral reading section was also to serve as a check of what the pupils were actually reading. The first three sections were comprised of fifteen items each while the last section consisted of nine sentences containing fifteen nonsense words. The five generalizations

were tested three times in each section to give a total of sixty items. A complete form of the vowel generalizations test may be found in Appendix A.

Section A - Inductive

In section A, inductive, the pupil was presented with five nonsense words in each item all applicable to one of the five generalizations. Each of the five generalizations was listed below the 'words' and the pupil had to identify the correct generalization which applied to all five nonsense words. The generalizations were listed in the same order for all fifteen items to facilitate the reading of these.

For example:

skod, gud, rath, stris, whes

- (a) A vowel in the middle of a word usually has a short sound.
- (b) A vowel at the end of a word usually has a long sound.
- (c) If two vowels are together, the first is long and the second is silent.
- (d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- (e) If there is a letter e at the end of the word, the first vowel sound is long.

Section B - Deductive

Section B, deductive, presented the pupil with one generalization in each item followed by five nonsense words. Each of the nonsense words followed one of the generalizations. The pupil had to identify correctly the nonsense word which applied. For example:

A vowel in the middle of a word usually has a short sound.

(a) whese (b) stris (c) wo (d) thaid (e) sporp

Section C - Written Application

The written application section required the pupil to apply a vowel rule to nonsense words. The pupil was asked to choose the nonsense word in each item that followed the same rule as the vowel sound in the underlined word found in the statement. Familiar words from Dolch's Basic Sight Word List (Dolch, 1955, pp. 373-374), which followed the vowel generalizations, were used for this purpose. The pupil had to choose the correct answer from five nonsense words, each of which applied to one of the generalizations. This section was patterned after Aaron's Test of Phonics Principles (1960, pp. 323-324) designed for teachers and prospective teachers. For example:

Choose the nonsense word that follows the same rule as the sound of e in get.

(a) whese (b) meid (c) zeck (d) ste (e) scerk

Section D - Oral Reading

Nine sentences, containing one to three nonsense words, comprised the oral reading section of the vowel generalizations test. A reading passage selected from Spache's Diagnostic Reading Scales (1963, p. 13) was used in the construction of this section. Fry's (1968) readability formula was used on this passage. The results fell

within the third grade level. A selection of grade three reading ability was chosen as this perhaps represents a grade four pupil's independent reading level (Harris, 1961, p. 154). Fifteen nonsense words not used in the previous sections were substituted for nouns in the passage. The passage was separated into individual sentences and numbered to make it easier for the reader. The pupil was asked to read the sentences orally and to pronounce the nonsense words as though they were ordinary words. As the investigator was interested in the pronunciation of the nonsense words only this aspect of the passage was marked. An example of one of the sentences is: The rab was feeding the wolf from a pail of sne.

Instructions for administering the test were formulated keeping in mind simplicity and the necessary steps required for a pupil to understand and successfully answer the questions. These were used in the pilot study and the necessary revisions were made. These instructions are outlined in Appendix B.

Administration of the Vowel Generalizations Test

The sixty-item vowel generalizations test was administered in May of 1970. Group testing for sections A, B, and C was undertaken in the pupils' own classroom. Pupils were tested individually on section D in a small quiet room free of excess distractions.

Previous to the administration of this test, the pupils received instructions concerning the use of answer sheets, nonsense words and generalizations. An overhead projector and transparencies were employed. Practice answer sheets using arithmetic questions whose physical format were similar to the vowel generalizations test were presented on a transparency. This gave the children an opportunity to learn how to properly score their answers. Gaffney (1970) concluded that when using answer sheets in grade four "a detailed set of instructions and a practice session are required to insure the validity of the data (p. 49)."

Ten nonsense words, not included in the test, were presented on the transparency and read to the children. Each generalization was exemplified by two of these words. A consonant generalization was then presented to the children and read to show them how we use rules in reading to help us know what to do.

The directions concerning this preliminary session of instructions are found in Appendix C.

Once the children received their answer sheets for the vowel generalizations test, section A was distributed. After each section was administered it was collected before passing out the subsequent section. The children were given a brief relaxation period between each section. All

responses were recorded on the answer sheets including section D.

An assistant helped the investigator administer the test by distributing and collecting tests and ensuring that the pupils were recording their responses correctly.

Pilot Study

A pilot study for the purposes of testing the instrument and to establish reliable scoring procedures was conducted in April, 1970. This involved an Edmonton Public School grade four class of twenty-two pupils.

The Kuder-Richardson formula 20 was used to determine the internal consistency of the test on vowel generalizations. This formula gives an indication of the extent to which each item measures what the whole test measures. The KR-20 reliability coefficient for the test was .895.

The reliability of the subtests, sections A to D, was also estimated. They were as follows:

Section A	.801
Section B	.736
Section C	.629
Section D	.696

As a result of this study a number of changes were made. Some of the nonsense words which were not working as distractors were revised. In section B when the generalizations which specified a letter were stated, the

distractors were revised so that each contained an e or r depending upon the statement, for example, noaf was changed to noef and ploes to proes. The statements used in section C were refined so they would be more precise. For example a statement read, "Choose the nonsense word that has the same u sound as you hear in run." This was changed to, "Choose the nonsense word that follows the same rule as the u sound in run."

A copy of the original vowel generalizations test followed by a list of the changes appear in Appendix A before the final draft of the test.

The reliability of scoring the oral responses to nonsense words in section D was established through inter-scorer agreement. This section had been taped during the pilot study and all of the tests were independently re-marked by a scorer trained in the field of reading.

The percentage of agreement between scorers was computed using the Arrington formula as quoted by Feifel and Lorge (1950). Accordingly, the number of responses that agreed (ie. doubling the agreements) was divided by the total plus the disagreements or $2 \times \text{agreements} / [(2 \times \text{agreements}) + \text{disagreements}]$.

The agreement between scorers was 95 percent. It was on this basis that the decision was made to score this section during the actual reading rather than to tape it and mark the answers later.

Validity of the Test

After the pilot study, the vowel generalizations test was submitted to all the members of the Elementary Education reading team for their advice. Face validity was established by the reading team.

Reliability of the Test

After the main experiment, the Kuder-Richardson formula 20 was again used to estimate the reliability of the revised vowel generalizations test. A reliability coefficient of .887 was computed.

The reliability of the subtests, sections A to D, was again calculated. The coefficients which resulted were as follows:

Section A	.738
Section B	.709
Section C	.685
Section D	.730

V. TREATMENT OF THE DATA

Each of the scores derived for the subjects was marked on the answer sheet which was used for recording the responses to the vowel generalizations test. The optical scanner automatically recorded the scores for each individual on a computer card.

All the data were analyzed by a computer using

programs supplied by the Division of Educational Research of the Faculty of Education, University of Alberta. The hypotheses were tested by using a one-way analysis of variance and a one-way analysis of covariance. The z scores were calculated using a test of the significance of the difference between two proportions for correlated samples. Informal analysis of errors on the oral reading section was also undertaken.

VI. SUMMARY

In this chapter a description of the procedures used in the project was presented. The sample was described and the standardized testing instruments were reviewed. The method of construction of the vowel generalizations test was specified. A description of the scoring procedures was followed by a brief outline of the statistical treatment of the data.

CHAPTER IV

THE FINDINGS OF THE STUDY

The findings of the study are presented in three main sections. The first section presents analyses of the data with respect to the hypotheses stated in Chapter I, while the second section presents the findings of the comparisons of pupils' performance on the sections of the vowel generalizations test. An analysis of the incorrect oral reading responses is presented in the third section.

I. THE FINDINGS WITH RESPECT TO THE HYPOTHESES

The range of scores, means, standard deviations and standard error of measurement of each section of the vowel generalizations test is presented in Table III. This information applies throughout all the hypotheses.

TABLE III
PERFORMANCE OF PUPILS ON EACH SECTION OF THE
VOWEL GENERALIZATIONS TEST

Sections	Number of Pupils	Range of Scores	Means	Standard Deviations	Standard Error of Measurement
A	146	2 - 15	11.03	2.96	1.51
B	146	2 - 15	12.43	2.79	1.51
C	146	2 - 15	10.18	3.09	1.73
D	146	1 - 15	10.49	3.04	1.58

Hypothesis One

There is no significant difference between the performance of pupils when evaluated inductively on section A of the vowel generalizations test and their performance on the written application form (section C), controlling for intelligence.

In order to determine whether a pupil recognized the vowel generalizations a criterion had to be established. The mean scores for sections A and B of the vowel generalizations test were 11.03 and 12.43 respectively, suggesting a mean for the two of twelve. Hence 80 percent was stipulated as the criterion score. Thus the sample was composed of two groups, those who scored twelve or above and those who achieved eleven or lower. The number in the first group was seventy-five and the number in the second group was seventy-one. Statistical analysis was undertaken to compare the performance of these two groups on section C, the written application form of the test.

To test this hypothesis, a one-way analysis of covariance was used. This is a statistical method used to control for "the effects of one or more uncontrolled variables, and permits, thereby, a valid evaluation of the outcome of the experiment (Ferguson, 1966, p. 326)." In this study the assignment to groups was not done at random and the subjects were not matched. Therefore in this situation, intelligence was an uncontrolled variable.

When adjustments were made for the difference in intelligence the results indicated a significant difference

between those who recognized the generalizations in section A and those who did not in comparing their performance on section C. The resultant F-ratio of 21.04 was significant beyond the .001 level. The hypothesis was rejected. The pupils' performance concerning the recognition of generalizations when presented inductively was related to their performance on the written form of the application test. This analysis is presented in Table IV.

TABLE IV

ANALYSIS OF COVARIANCE ON SECTION C OF THE VOWEL
GENERALIZATIONS TEST COMPARED TO SECTION A
(I.Q. AS COVARIABLE)

Source	df	MS	ADJ F	P
Groups	1	155.46	21.04	<.001
Error	143	7.39		

As the original criterion score was established at the 80 percent level, it was decided that further analysis would be desirable to investigate the results of different groupings using higher percentages for criterion scores. This was done to throw additional light upon the hypothesis. Three alternative classifications were used on the basis of the following criteria. The criterion score was raised in each comparison and the performance of the resulting two groups was analyzed statistically. The three

additional criteria measures used were thirteen to fifteen, fourteen to fifteen and fifteen items correct. Analysis was undertaken to compare the performance of these new groups on section C, the written application form of the test. The procedure yielded what will be termed in this study a sliding scale. Table V presents this tabulation.

TABLE V

ANALYSIS OF COVARIANCE AMONG GROUPS COMPARING
PERFORMANCE ON SECTION A WITH ACHIEVEMENT
ON SECTION C, HOLDING I.Q. AS COVARIATE

Groups formed on the basis of section A	Source	df	MS	ADJ F	P
I	II				
0-11 (71)*	12-15 (75)*	Groups	1	155.46	21.04 <.001
		Error	143	7.39	
0-12 (92)	13-15 (54)	Groups	1	203.09	28.78 .001
		Error	143	7.05	
0-13 (117)	14-15 (29)	Groups	1	152.03	20.51 .001
		Error	143	7.41	
0-14 (135)	15 (11)	Groups	1	75.48	9.50 .002
		Error	143	7.95	

*Number in each group

All of the F-ratios were significant. Thus regardless of the criterion from 80 percent to 100 percent those who recognized the generalizations in section A did

significantly better than those who did not recognize the generalizations when their performance was compared on the written form of the application test, section C. The use of different classifications for grouping to compare the pupils' performance further supports the rejection of this hypothesis. The recognition of generalizations presented inductively predicted the pupils' performance on the written form of the application test.

The statistical procedures used to test hypothesis one plus the sliding scale and criterion score were also utilized in hypotheses two, three and four.

Hypothesis Two

There is no significant difference between the performance of pupils when evaluated inductively on section A of the vowel generalizations test and their performance on the oral application form (section D), controlling for intelligence.

A one-way analysis of covariance, controlling for intelligence, as previously mentioned, was used to test this hypothesis. The criterion score of 80 percent was again employed.

Table VI presents the results of this analysis. The pupils' performance on section A (inductive) was not a factor in predicting their ability to pronounce nonsense words correctly. The resultant F-ratio of .16 was not significant. Consequently this hypothesis was accepted.

TABLE VI

 ANALYSIS OF COVARIANCE ON SECTION D OF THE VOWEL
 GENERALIZATIONS TEST COMPARED TO SECTION A
 (I.Q. AS COVARIABLE)

Source	df	MS	ADJ F	P
Groups	1	1.29	.16	.688
Error	143	7.99		

When the comparison was undertaken using the sliding scale the same results were revealed. None of the F-ratios on Table VII were significant. The pupils could pronounce nonsense words and this appeared to have little statistical relationship to their ability to recognize generalizations when presented inductively. These results lend support to the acceptance of the hypothesis.

TABLE VII
ANALYSIS OF COVARIANCE AMONG GROUPS COMPARING
PERFORMANCE ON SECTION A WITH ACHIEVEMENT
ON SECTION D, HOLDING I.Q. AS COVARIATE

Groups formed on the basis of section A		Source	df	MS	ADJ F	P
I	II					
0-11 (71)*	12-15 (75)*	Groups	1	1.29	.16	.688
		Error	143	7.99		
0-12 (92)	13-15 (54)	Groups	1	4.61	.57	.448
		Error	143	7.97		
0-13 (117)	14-15 (29)	Groups	1	11.92	1.51	.222
		Error	143	7.92		
0-14 (135)	15 (11)	Groups	1	.42	.05	.820
		Error	143	7.80		

*Number in each group

Hypothesis Three

There is no significant difference between the performance of pupils when evaluated deductively on section B of the vowel generalizations test and their performance on the written application form (section C), controlling for intelligence.

To test this hypothesis a one-way analysis of covariance, controlling for intelligence, with a criterion score of 80 percent was again implemented.

Upon evaluation of section B (deductive), two groups were formed. The pupils who recognized the generalizations performed significantly different on section C, the written

form of the application test, than the pupils who did not recognize the generalizations. The results of the analysis is found in Table VIII.

TABLE VIII

ANALYSIS OF COVARIANCE ON SECTION C OF THE VOWEL
GENERALIZATIONS TEST COMPARED TO SECTION B
(I.Q. AS COVARIABLE)

Source	df	MS	ADJ F	P
Groups	1	47.51	5.83	.017
Error	143	8.14		

The F-ratio of 5.83 obtained from the test of this hypothesis was significant beyond the .05 level. Therefore this hypothesis was rejected. The pupils who recognized the generalizations in the deductive section also performed significantly better on the written application section than those who did not recognize the generalizations.

These results were similar when the analysis was conducted using the sliding scale with the exception of one group. Three of the F-ratios were significant beyond the .05 level. The group which had thirteen to fifteen correct approached the level of significance. The additional groupings further support rejection of the hypothesis. The pupils' performance when presented with generalizations deductively predicted their performance on

the written form of the application test. The results of this analysis is shown in Table IX.

TABLE IX

ANALYSIS OF COVARIANCE AMONG GROUPS COMPARING
PERFORMANCE ON SECTION B WITH ACHIEVEMENT
ON SECTION C, HOLDING I.Q. AS COVARIATE

Groups formed on the basis of section B		Source	df	MS	ADJ F	P
I	II					
0-11 (36)*	12-15 (110)*	Groups	1	47.51	5.83	.017
		Error	143	8.14		
0-12 (59)	13-15 (87)	Groups	1	21.57	2.59	.110
		Error	143	8.33		
0-13 (77)	14-15 (69)	Groups	1	45.44	5.57	.020
		Error	143	8.16		
0-14 (111)	15 (35)	Groups	1	46.28	5.68	.019
		Error	143	8.15		

*Number in each group

Hypothesis Four

There is no significant difference between the performance of pupils when evaluated deductively on section B of the vowel generalizations test and their performance on the oral application form (section D), controlling for intelligence.

Again a one-way analysis of covariance controlling for intelligence was employed. A criterion score of 80 percent was specified.

The pupils' performance on section B (deductive) did not appear to be a factor in predicting their ability to pronounce nonsense words correctly. The resultant F-ratio produced a probability of .909 which was not significant. Consequently this hypothesis was retained. The results of this analysis are shown in Table X.

TABLE X

ANALYSIS OF COVARIANCE ON SECTION D OF THE VOWEL GENERALIZATIONS TEST COMPARED TO SECTION B
(I.Q. AS COVARIABLE)

Source	df	MS	ADJ F	P
Groups	1	.10	.01	.909
Error	143	7.99		

The findings obtained when further analysis was undertaken using the sliding scale authenticated this finding. None of the F-ratios in Table XI were significant.

These results indicate that the pupils' ability to recognize generalizations is not a predictor of their ability to pronounce nonsense words correctly. The formal recognition of these generalizations apparently is not always utilized by children. There is a need to learn more about intuitive knowledge and the role that proficiency with oral language plays in childrens' ability to cope with words.

TABLE XI

 ANALYSIS OF COVARIANCE AMONG GROUPS COMPARING
 PERFORMANCE ON SECTION B WITH ACHIEVEMENT
 ON SECTION D, HOLDING I.Q. AS COVARIATE

Groups formed on the basis of section B		Source	df	MS	ADJ F	P
I	II					
0-11 (36)*	12-15 (110)*	Groups	1	.10	.01	.909
		Error	143	8.00		
0-12 (59)	13-14 (87)	Groups	1	.24	.03	.862
		Error	143	8.00		
0-13 (77)	14-15 (69)	Groups	1	.45	.06	.813
		Error	143	8.00		
0-14 (111)	15 (35)	Groups	1	.11	.01	.905
		Error	143	8.00		

*Number in each group

Hypothesis Five

There is no significant difference between the means on each of the five types of generalizations within each section of the vowel generalizations test.

A one-way analysis of variance with repeated measures was used to test this hypothesis. The results of this investigation are shown in Table XII. A comparison was made among the scores obtained by the pupils who wrote the test. In addition, each subject served as his own control and his responses to the five types of generalizations were

considered as the different treatments.

TABLE XII
ANALYSIS OF VARIANCE ON VOWEL GENERALIZATIONS
(REPEATED MEASURES)

Source	df	MS	F-ratio	P
Between people	145	15.16		
Within people	584	3.08		
Treatments	4	43.95	15.70	<.001
Residual	580	2.80		
Total	729			

The difference among the means of the vowel generalizations was significant beyond the .001 level.

The resultant F-ratio of 15.70 was significant. Therefore, this hypothesis was rejected.

To determine the precise differences between the means of each of the five vowel generalizations a further one-way analysis of variance was undertaken. The differences between the means had to be significant beyond the .01 level in order to be acceptable. This analysis is found in Table XIII.

The "vowel digraph" and "r controller" generalizations produced means which were significant with the "short vowel" and "final e" generalizations. The mean of the "vowel digraph" generalization was also significant with the "long vowel" generalization.

TABLE XIII
DIFFERENCES BETWEEN MEANS OF THE VOWEL GENERALIZATIONS
AND PROBABILITIES OF t SCORES ASSOCIATED WITH THEM

Vowel Generalizations	Means	Difference in Means	Prob. of <u>t</u> 's
vowel digraph	9.61	.49	.012
<u>r</u> controller	9.12		
vowel digraph	9.61	.96	<.001*
long vowel	8.65		
vowel digraph	9.61	1.16	<.001*
short vowel	8.45		
vowel digraph	9.61	1.36	<.001*
final <u>e</u>	8.25		
<u>r</u> controller	9.12	.47	.042
long vowel	8.65		
<u>r</u> controller	9.12	.67	.001*
short vowel	8.45		
<u>r</u> controller	9.12	.87	<.001*
final <u>e</u>	8.25		
long vowel	8.65	.20	.316
short vowel	8.45		
long vowel	8.65	.40	.059
final <u>e</u>	8.25		
short vowel	8.45	.20	.233
final <u>e</u>	8.25		

* Significant at .01 level

The generalizations have been ranked according to their means in Table XIV, an extract from Table XIII. A visual analysis of these means suggested the generalizations formed two groups. The "vowel digraph" and "r controller" generalizations formed one group of similar difficulty while the "long vowel", "short vowel" and "final e" generalizations formed the most difficult group. Further analysis, as revealed in Table XIII, appeared to confirm this finding. It showed that significant differences exist between the "vowel digraph" generalization and the "long vowel", "short vowel" and "final e" generalizations. The "r controller" was significantly different than the "short vowel" and "final e" generalizations. The difference between the "vowel digraph" and the "r controller" generalizations approached the level of significance.

The "vowel digraph" generalization was easiest for most children. Often this generalization is taught to children as the rhyme, "when two vowels go out walking, the first one does the talking (Burrows and Lourie, 1963, p. 79)." Perhaps the rhyme makes it easier for the children to recall this generalization.

Burmeister (1968b), as reported in Chapter II, found when analyzing word lists that the "vowel digraph" generalization has limited usefulness. The children in this study seemed to be able to apply this generalization while its validity is questionable.

TABLE XIV
MEANS OF THE FIVE VOWEL GENERALIZATIONS RANKED
FROM HIGHEST*

Vowel generalizations	Mean
Vowel digraph	9.61
<u>r</u> controller	9.12
long vowel	8.65
short vowel	8.45
final <u>e</u>	8.25

*extract from Table XIII

Hypothesis Six

There is no significant difference between the scores attained by boys and girls on each section of the vowel generalizations test.

A one-way analysis of variance was used to test this hypothesis. t values and their probability levels between boys and girls were calculated. The results of this tabulation are presented in Table XV.

TABLE XV
BOYS AND GIRLS COMPARED ON THE VOWEL
GENERALIZATIONS TEST

Section	Mean of Boys	Mean of Girls	df	<u>t</u>	P
A	10.96	11.12	144	-0.324	.746
B	12.37	12.51	144	-0.295	.768
C	9.99	10.43	144	-0.859	.392
D	10.54	10.43	144	0.222	.825

Sex did not prove to be a factor in this particular study in predicting pupils' ability to recognize and apply vowel generalizations. The resultant t ratios were not significant. Consequently this hypothesis was retained.

Hypothesis Seven

There is no significant difference between good and poor readers on each section of the vowel generalizations test when intelligence is controlled.

Scores from the California Reading Test were obtained for each of the subjects.

The mean of the reading scores was calculated to determine which pupils belonged in each group. The mean was found to be 5.9. Good and poor readers were then defined as those pupils whose scores fell above and below one-quarter of a standard deviation of the mean respectively. This resulted in groups of sixty good readers and sixty-three poor readers. These pupils' scores were one grade level above the California Reading Test norms. The tendency for Edmonton pupils to score higher than the mean established by the California Reading Test was also reported by a reading supervisor of the Edmonton Public School System.

To test this hypothesis a one-way analysis of covariance was used controlling for intelligence as in hypotheses one to four. When adjustment was made for the difference in intelligence the results indicated a

significant difference between good and poor readers on each section of the vowel generalizations test. The F-ratios of 5.88 for section A, 8.01 for section B, 4.66 for section C and 4.80 for section D were significant beyond the .05 level. Therefore this hypothesis was rejected.

Table XVI presents a summary of the performance of good and poor readers on each section of the vowel generalizations test.

TABLE XVI

ANALYSIS OF COVARIANCE COMPARING GOOD READERS AND POOR READERS ON EACH SECTION OF THE VOWEL GENERALIZATIONS TEST (I.Q. AS COVARIABLE)

Section	Unadj Mean		Adj Mean		Source	df	MS	F-ratio	P
	I*	II+	I*	II+					
A	12.02	10.10	11.80	10.30	Groups	1	46.78	5.88	.017
						120	7.96		
B	13.31	11.54	13.29	11.57	Groups	1	61.99	8.01	.005
						120	7.74		
C	11.35	9.11	10.92	9.56	Groups	1	41.21	4.66	.033
						120	8.84		
D	11.62	9.29	11.12	9.76	Groups	1	38.74	4.80	.031
						120	8.09		

* good readers
+ poor readers

Regardless of the type of task involved (inductive, deductive, written application or oral reading) on the vowel generalizations test, the good readers were able to do significantly better than the poor readers.

II. FINDINGS REVEALED THROUGH COMPARISON OF PUPILS' PERFORMANCE ON THE SECTIONS OF THE VOWEL GENERALIZATIONS TEST

In addition to testing the formal hypotheses, a comparison of the pupils' performance on the sections of the vowel generalizations test was conducted. z scores were calculated using a test of the significance of the difference between two proportions for correlated samples (Ferguson, 1966, pp. 178-181).

The criterion for passing a section was established as 80 percent, similar to the criterion used in hypotheses one to four.

Comparison of Pupils' Performance on Sections A and B

The z score of 5.47 was significant beyond the .001 level when comparing performance on sections A and B. This analysis is found in Table XVII.

Seventy-five pupils passed section A. Three of this group failed section B while the others passed. If pupils passed section A (inductive) this could be used as a predictor for their ability to pass section B (deductive).

TABLE XVII
SUMMARY OF PUPILS' PERFORMANCE ON SECTIONS A AND B

		Section B		
		Fail	Pass	
Section A	Pass	3	72	75
	Fail	33	38	71
		36	110	146
$\underline{z} = 5.47; \quad p < .001$				

Those pupils who were proficient in working with generalizations using the inductive approach could work just as effectively when the generalizations were presented by the deductive method.

Seventy-one pupils failed section A of which thirty-eight passed section B. The failing of section A did not appear to be a predictor for the failing of section B. Some of the pupils who were unable to cope with the inductive approach were capable of handling generalizations when presented deductively.

Comparison of Pupils' Performance on Sections C and D

When comparing the performance of pupils on sections C and D the z score of 2.19 was significant beyond the .05 level. The results of this finding are shown in Table XVIII.

TABLE XVIII
SUMMARY OF PUPILS' PERFORMANCE ON SECTIONS C AND D

		Section D		51
		Fail	Pass	
Section C	Pass	16	35	95
	Fail	64	31	
		80	66	146

$$\underline{z} = 2.19; \quad p < .05$$

Of the fifty-one pupils who passed section C, sixteen failed section D and thirty-five passed. This suggests that if pupils succeeded on the written application test they would also be capable of satisfactorily handling the oral form of the application test. Ninety-five children failed section C. Of this group, sixty-four failed section D and thirty-one passed. The failure of the written form likewise predicted the pupils' performance on the oral form.

Comparison of Pupils' Performance on Combined Scores
of Sections A and B with Section C

The comparison of the performance of the pupils on sections A and B combined produced a z score of -3.50 which was significant beyond the .001 level. If pupils passed both sections A and B there was a significant relationship to their performance on section C. A total of ninety-two passed A and B. Of these, thirty-eight failed section C and fifty-four passed. The failing of A and B could be used as a predictor for failing section C. Of the fifty-four who failed sections A and B, forty-one of this group failed section C while thirteen passed. This perhaps suggests that pupils who were unable to work effectively with vowel generalizations presented inductively and deductively also experienced difficulty in handling the written form of the application test. The results of this analysis is shown in Table XIX.

TABLE XIX

SUMMARY OF PUPILS' PERFORMANCE ON COMBINED SCORES
OF SECTIONS A AND B WITH SECTION C

		Section C		
		Fail	Pass	
Sections A and B	Pass	38	54	92
	Fail	41	13	54
		79	67	146

$$z = -3.50; \quad p < .001$$

Comparison of Pupils' Performance on Combined Scores of
Sections A and B with Section D

The z score of -1.10 was not significant in comparing the performance of pupils on combined sections of A and B and section D as reported in Table XX.

The pupils' ability to recognize generalizations, whether presented inductively or deductively, is not a predictor of his ability to cope with the oral form of the application test. Of the ninety-two pupils who passed combined sections A and B, thirty-eight failed section D and fifty-four passed section D. Failing sections A and B was not a predictor of the performance on section D. Fifty-four failed A and B. Of this group twenty-five failed

TABLE XX

SUMMARY OF PUPILS' PERFORMANCE ON COMBINED SCORES OF
SECTIONS A AND B WITH SECTION D

		Section D		92
		Fail	Pass	
Sections A and B	Pass	38	54	
	Fail	25	29	54
		63	83	146

z = -1.10; not sig. at .05 level

section D and twenty-nine passed. The pupils' proficiency with the oral language is possibly a greater help than the formal presentation of vowel generalizations.

III. ANALYSIS OF COMMON ERRORS ON SECTION D -

ORAL FORM OF THE APPLICATION TEST

Section D, the oral form of the application test, revealed various errors between spoken and printed symbol. An analysis of the errors was undertaken to determine if any common features existed.

In order for an error to be considered significant it had to be committed by four pupils. This tabulation is

presented in Table XXI. The nonsense words were listed in the order of appearance in the story followed by the correct pronunciation using the Thorndike-Barnhart Junior Dictionary as the authority. This dictionary was utilized as it is commonly used in elementary classrooms. After the correct pronunciation of the nonsense word, the total number of errors committed by the pupils was given. This was followed by samples of the incorrect pronunciations and the number of times each error was committed.

The majority of errors involved incorrect pronunciation of the vowel sound. Possibly the children were paying attention only to the configuration or gestalt of the word and guessing at the vowel sound. This possibly substantiates the opinions of reading authorities (Heilman, 1968; Spache and Spache, 1969) that vowels are more difficult than consonants as reported in Chapters I and II.

There was a tendency to substitute real words for nonsense words although the children had received instructions that nonsense words were present, for example, stroll was given for strope and pool for po. This indicated that reading to these grade four children meant more than word calling. The context was meaningful to the children and by substituting real words they were striving to achieve meaning.

TABLE XXI
ANALYSIS OF COMMON ERRORS ON SECTION D -
ORAL READING

Nonsense Word*	Pronunciation+	Total Errors	Common Errors
strope	(strōp)	32	strop (9) stroll (5)
po	(pō)	23	pōō (10) pool (7)
fain	(fān)	32	frān (12) fan (8)
blerks	(blerks)	30	berks (9) breks (5)
mubes	(mūbs)	131	mubs (58) mūbs (27) mums (16) mumbles (5)
plurm	(plērm)	36	plum (11)
flom	(flom)	80	flōm (48) flum (7) flōrm (6)
lirt	(lērt)	15	litter (5)
gleep	(glēp)	20	none significant
floap	(flōp)	49	flop (38)
rab	(rab)	13	rāb (5)
sne	(snē)	63	śēn (17) sin (10) snu (5)
gle	(gle)	86	gāl (14) glā (11) gle (11) gul (10)
vip	(vip)	21	vīp (8)
kime	(kim)	69	kim (28) kēm (19) kem (6)

* in order of appearance in the story

+ Thorndike-Barnhart Junior Dictionary, 1962.
Pronunciation key in Appendix D

Table XXII, an extract from Table XXI, groups the errors of the nonsense words according to the vowel generalizations.

TABLE XXII
ERRORS ON SECTION D GROUPED ACCORDING TO VOWEL
GENERALIZATIONS*

Generalizations	Nonsense Words and Number of Errors			Total Errors
vowel digraph	fain	-	32	101
	gleep	-	20	
	floap	-	49	
<u>r</u> controller	blerks	-	30	81
	plurm	-	36	
	lirt	-	15	
long vowel	po	-	23	172
	sne	-	63	
	gle	-	86	
short vowel	flom	-	80	114
	rab	-	13	
	vip	-	21	
final <u>e</u>	mubes	-	131	232
	strope	-	32	
	kime	-	69	

*extract from Table XXI

It appears that the "final e" nonsense words caused the most difficulty. This finding was similar to the results of hypothesis five which indicated that the "final e" generalization was the most difficult on the whole test. Considering the types of errors the children made when

confronted with "final e" words, it is apparent that the children had not attended to the "final e" or were unaware of its role in making the preceding vowel long. In all three of the "final e" words the majority of errors involved pronouncing the short vowel sound, for example, kim for kime; mubs for mubes; strop for strophe. The children involved in this study had received the majority of their reading instruction in the Ginn and Gage basal reading series. These publications do not stress the single vowel-consonant-final e pattern as much as a linguistically oriented reading series which perhaps explains the childrens' inability to cope with this generalization. The position of the vowels in the words, which are applicable to each of the generalizations, is perhaps significant. This was the only generalization in which the children had to pay attention to three letters. For example, the "final e" generalization involves the child looking at a vowel-consonant-vowel pattern as opposed to a vowel-r pattern for the "r controller", vowel-vowel pattern for the "vowel digraph" and single vowel patterns for both the "short and long vowel generalizations".

A visual analysis of errors committed on each of the sections of the vowel generalizations test suggested the pupils had less difficulty in recognizing the "final e" generalization than in the application of it. This possibly indicates the pupils have grasped the 'theory' of this generalization but transfer to the 'practical' was deficient.

Burmeister (1969) as reported in Chapter II found the "final e" generalization to be highly useful when analyzing word lists. As the children in this study seldom found it useful perhaps this illustrates the problem of utility levels. This generalization is valid but the applicability of it is questionable.

Table XXII also indicates that the pupils' performance on section D reflected their performance on the whole test as revealed in hypothesis five. The generalizations concerning the "vowel digraph" and the "r controller" involved fewer errors than the "long vowel", "short vowel" and "final e" generalizations.

IV. SUMMARY OF THE RESULTS

The results of the data analysis may be summarized:

I. For the research hypothesis:

(1) the performance of pupils on the written form of the application test (section C) was significant beyond the .05 level when comparing those who recognized the generalizations as opposed to those who did not recognize the generalizations on the inductive (section A) and deductive (section B) parts of the vowel generalizations test. One group on the deductive section was an exception but they approached the level of significance.

(2) the performance of the pupils on the oral form of the application test (section D) was not significant when

comparing those who recognized the generalizations as opposed to those who did not recognize the generalizations on the inductive (section A) and deductive (section B) parts of the vowel generalizations test.

(3) the performance on the vowel generalizations were significantly different beyond the .001 level in terms of their degree of difficulty.

(4) sex was not a significant factor in predicting scores on the vowel generalizations test.

(5) good readers did significantly better than poor readers beyond the .05 level on all four sections of the vowel generalizations test involving recognition and application of these generalizations.

II. For the comparison of performance on sections of the test:

(1) recognizing the generalizations inductively was a predictor for recognizing them deductively but the inability to use generalizations inductively was not a predictor of inability to use them deductively.

(2) the performance on the written form of the application test (section C) could be used as a predictor of the performance on the oral form of the application test (section D).

(3) the performance on combined sections A (inductive) and section B (deductive) and could be used as a predictor of the performance on the written form of the

application test (section C).

(4) the performance on combined section A (inductive) and section B (deductive) could not be used as a predictor of the performance on the oral form of the application test (section D).

III. In analyzing the sources of common error on section D the following appeared more frequently:

- (1) the children did not make appropriate links between the sounds and symbols of the vowels.
- (2) they tended to substitute real words for nonsense words in order to make the content meaningful.
- (3) the "final e" nonsense words were the most difficult.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

I. SUMMARY OF THE STUDY

This study investigated the ability of fourth grade pupils to recognize and apply vowel phonic generalizations.

A sample of 146 grade four children from five Edmonton Public Schools was selected for the study. An elementary consultant designated schools having complete grade four classes on the six year program. The principals specified the available classes.

To determine the ability of pupils to recognize and apply vowel phonic generalizations, a vowel generalizations test was prepared by the investigator. This test was designed to examine five vowel generalizations. The test consisted of four sections. The first two pertained to the recognition of generalizations using the inductive and deductive approaches respectively, while the third and fourth sections consisted of the application of generalizations using written and oral approaches. The test was administered by the investigator with the help of an assistant during the month of May, 1970. Additional data collected about each child included I.Q. score, California Reading Test score, and sex.

The test was scored by the optical scanner. To find out whether the performance of the pupils on the written and oral reading application sections differed significantly when grouped according to recognition of vowel generalizations presented inductively and deductively, a one-way analysis of covariance was undertaken. The same statistical analysis was used to determine if there was a significant difference between good and poor readers on the vowel generalizations test. A one-way analysis of variance was used to determine if there was a significant difference between: (a) the means of the vowel generalizations, and (b) the scores attained by boys and girls. Further analysis to compare the pupils' performance on the sections of the vowel generalizations test was conducted by calculating z scores. Informal analysis of errors on the oral reading section was also reported.

II. CONCLUSIONS

The following conclusions may be drawn:

(1) the ability to recognize generalizations whether presented inductively or deductively was significant beyond the .05 level in predicting pupils' performance on the written form of the application test with the exception of one group on the deductive section. This group approached the level of significance.

(2) the ability to recognize generalizations whether presented inductively or deductively was not significant in

predicting pupils' performance on the oral form of the application test.

When children are confronted with new words which they must read silently, their performance is predictable according to their ability to recognize vowel generalizations. However, this ability was not a predictor of the childrens' success or failure in coping with oral reading. The pupils were able to pronounce words regardless of their ability to recognize generalizations. Possibly these results are due to the difference in format of the application sections of the vowel generalizations test. Section C, the written application, was constructed so the pupils had to use a vowel generalization in order to identify correctly the answer. Section D, oral reading, required the pupils to read without actually thinking about generalizations.

(3) the means of the scores of the five vowel generalizations were significantly different beyond the .001 level in terms of their degree of difficulty. When ranked in order of difficulty from easiest to hardest, they are as follows: (a) vowel digraph, (b) r controller, (c) long vowel, (d) short vowel and (e) final e.

(4) sex was not a significant factor in predicting scores on the vowel generalizations test. This result disagrees with Fagan's (1965) study which reported that boys were better in applying their phonic knowledge than were girls. Possibly the difference is due to the different

samples or that Fagan's study involved third grade and seventh grade pupils.

(5) good readers did significantly better than poor readers beyond the .05 level on each section of the vowel generalizations test. This suggests first, that the pupils' achievement on the vowel generalizations test was dependent upon their reading ability, and second, that good readers can handle vowel generalizations more readily than poor readers.

(6) no conclusions can be drawn about different approaches in testing generalizations from the results of this study.

(7) a predictor for deductive recognition of vowel generalizations was inductive recognition of vowel generalizations although the converse was not true. Children seemed to be able to cope with the deductive approach easier than the inductive approach.

(8) the results of the oral form of the application test (section D) could be predicted by the child's performance on the written form of the application test (section C). It appeared that the pupils' ability to apply a generalization while reading silently was directly related to their ability to orally pronounce words.

(9) the performance on the written form of the application test (section C) was predictable by the performance on combined section A (inductive) and section B (deductive).

(10) the performance on the oral form of the application test (section D) was not predictable by the performance on combined section A (inductive) and section B (deductive). The ability to work with generalizations whether presented inductively or deductively was an indication of the performance on the written form of the application test but not on the oral form of the application test.

(11) the children did not attend to the different vowel sounds. In most cases the consonants were correctly pronounced but different variations of the vowel were stated.

(12) in order to make the content meaningful there was a tendency to substitute real words for nonsense words by the children. Reading to these children appears to be more than just word calling.

(13) the nonsense words containing the final e were found to be the most difficult both in recognition and application.

III. IMPLICATIONS FOR TEACHING

The following implications for teaching may be considered as a result of the conclusions of this study:

(1) although vowel generalizations are presented and learned and may be beneficial to some degree, the formal presentation and learning of these is questionable.

Possibly the children's facility with their own language is more beneficial than the formal learning of vowel generalizations. This study indicates that children perhaps generalize on their own from their experience with the language. They appear to understand the concept but are unable to formalize it.

(2) teachers should be aware that some of the vowel generalizations are more difficult than others for the children. Possibly the amount of difficulty involved in handling the generalizations plus their low utility levels as reported in Chapter II also make the teaching of generalizations questionable.

Some researchers (Emans, 1967; Maresh, 1969) have stated that the generalizations should be re-worded to increase their utility level as reported in Chapter II. The vowel generalizations used in this study were re-worded to make the terminology easier. Perhaps teachers should consider these two factors when teaching vowel generalizations and make revisions suitable to the needs of their pupils.

(3) teachers should be aware of the difficulty the children experience in making the appropriate linkage between symbol and sound for the various vowel sounds.

IV. SUGGESTIONS FOR FURTHER RESEARCH

As a result of the study, the need for research in the following areas seems evident:

(1) there is a need for the results of this study to be verified with a larger random sample of subjects and possibly with a different grade level.

(2) consonant generalizations have a higher utility level than the vowel generalizations which have been tested in this study (Clymer, 1963; Bailey, 1967; Emans, 1967). As the usefulness of vowel generalizations is now questionable, studies should be conducted to determine how beneficial consonant generalizations (with their higher utility level) are to children.

(3) if generalizations continue to be taught there is a need to determine whether the inductive method or the deductive method is the most effective approach for particular learners or if other approaches can be employed.

(4) an analysis of each vowel generalization to determine what makes one more difficult than the others would be beneficial.

(5) the concept level of vowel generalizations should be investigated to determine if children in the primary grades are capable of handling these concepts.

(6) there is a need to determine the relationship

of phonic generalizations and general reading ability in terms of level of performance, grade levels and the level of accomplishment in reading.

(7) there is a need to learn more about intuitive knowledge and the role that proficiency with oral language plays in childrens' ability to cope with words.

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A P P E N D I X A

- I. ORIGINAL VOWEL GENERALIZATIONS TEST
- II. REVISIONS TO THE ORIGINAL VOWEL GENERALIZATIONS TEST
- III. FINAL DRAFT OF THE VOWEL GENERALIZATIONS TEST

(The first three sections of the test were numbered one to fifteen, thirty-six to fifty and seventy-one to eighty-five respectively to correspond to the fifteen numbers at the beginning of the first three columns of the answer sheet.)

ORIGINAL VOWEL GENERALIZATIONS TEST

Section A

Choose the correct generalization that applies to all of these "words".

1. frike, sebe, smule, nipe, rafe

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel has neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is Tong.

2. ste, sha, bry, wo, spe

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel has neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is Tong.

3. blaip, sloak, keat, meid, ploes

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel has neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is Tong.

4. dwer, sparm, dirsh, scur, forn

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.

- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel has neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is Tong.

5. ploke, rete, shuke, quike, brate

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel has neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is Tong.

6. glirm, furp, scern, darch, sporp

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel has neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is Tong.

7. zeck, mosh, glit, chas, hus

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel has neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is Tong.

8. sart, thirb, shorm, murst, scerk

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.

D] If a vowel is followed by r, the vowel has neither a long nor short sound.

E] If there is a letter e at the end of the word, the first vowel sound is Tong.

9. groet, ceit, freep, thaid, noaf

A] A vowel in the middle of a word usually has a short sound.

B] A vowel at the end of a word usually has a long sound.

C] If two vowels are together, the first sound is long and the second is silent.

D] If a vowel is followed by r, the vowel has neither a long nor short sound.

E] If there is a letter e at the end of the word, the first vowel sound is Tong.

10. leet, tein, shoan, dieb, puet

A] A vowel in the middle of a word usually has a short sound.

B] A vowel at the end of a word usually has a long sound.

C] If two vowels are together, the first sound is long and the second is silent.

D] If a vowel is followed by r, the vowel has neither a long nor short sound.

E] If there is a letter e at the end of the word, the first vowel sound is Tong.

11. skod, gud, rath, stris, whes

A] A vowel in the middle of a word usually has a short sound.

B] A vowel at the end of a word usually has a long sound.

C] If two vowels are together, the first sound is long and the second is silent.

D] If a vowel is followed by r, the vowel has neither a long nor short sound.

E] If there is a letter e at the end of the word, the first vowel sound is Tong.

12. sku, dre, swo, twe, shra

A] A vowel in the middle of a word usually has a short sound.

B] A vowel at the end of a word usually has a long sound.

C] If two vowels are together, the first sound is long and the second is silent.

D] If a vowel is followed by r, the vowel has neither a long nor short sound.

E] If there is a letter e at the end of the word, the first vowel sound is Tong.

13. spro, whe, ri, smy, pru

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel has neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is long.

14. bret, sab, thob, mid, blum

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel is neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is long.

15. whese, yine, hote, stome, glake

- A] A vowel in the middle of a word usually has a short sound.
- B] A vowel at the end of a word usually has a long sound.
- C] If two vowels are together, the first sound is long and the second is silent.
- D] If a vowel is followed by r, the vowel is neither a long nor short sound.
- E] If there is a letter e at the end of the word, the first vowel sound is long.

Section B

Choose the nonsense word which applies to the generalization.

36. If there is a letter e at the end of the word, the first vowel sound is Tong.

A] zeck B] smule C] ste D] gud E] noaf

37. A vowel at the end of a word usually has a long sound.

A] sku B] whes C] yine D] dirsh E] sloak

38. If two vowels are together, the first sound is long and the second is silent.

A] rete B] tein C] glirn D] spro E] chas

39. If a vowel is followed by r, the vowel has neither a long nor short sound.

A] dwer B] hus C] shra D] ploes E] stome

40. If there is a letter e at the end of the word, the first vowel sound is Tong.

A] spe B] noaf C] quike D] blaip E] scur

41. If a vowel is followed by r, the vowel has neither a long nor short sound.

A] puet B] whe C] thob D] brate E] scerk

42. A vowel in the middle of a word usually has a short sound.

A] groet B] bry C] rath D] shuke E] darch

43. If a vowel is followed by r, the vowel has neither a long nor short sound.

A] sebe B] murst C] ri D] glit E] keat

44. If two vowels are together, the first sound is long and the second is silent.

A] mosh B] glake C] smy D] meid E] sparm

45. If two vowels are together, the first sound is long and the second is silent.

A] swo B] shoan C] forn D] nipe E] blum

46. A vowel in the middle of a word usually has a short sound.

A] whese B] stris C] wo D] thaid E] sporp

47. A vowel at the end of a word usually has a long sound.

A] freep B] thirb C] skod D] twe E] smule

48. A vowel at the end of a word usually has a long sound.

A] ploke B] bret C] sha D] dieb E] furp

49. A vowel in the middle of a word usually has a short sound.

A] shorm B] pru C] sab D] frike E] leet

50. If there is a letter e at the end of the word, the first vowel sound is long.

A] scerk B] mid C] ceit D] dre E] rafe

Section C

Apply a vowel rule to nonsense words.

71. Choose the nonsense word that has the same o sound as you hear in those.

A] mosh B] sporp C] groet D] wo E] hote

72. Choose the nonsense word that has the same e sound as you hear in he.

A] ceit B] bret C] dre D] dwer E] rete

73. Choose the nonsense word that has the same a sound as you hear in rain.

A] chas B] rafe C] shra D] thaid E] sart

74. Choose the nonsense word that has the same i sound as you hear in first.

A] quike B] dirsh C] glit D] ri E] dieb

75. Choose the nonsense word that has the same i sound as you hear in like.

A] thirb B] stris C] dieb D] quike E] ri

76. Choose the nonsense word that has the same u sound as you hear in hurt.

A] hus B] puet C] sku D] murst E] shuke

77. Choose the nonsense word that has the same u sound as you hear in run.

A] blum B] pru C] puet D] furp E] smule

78. Choose the nonsense word that has the same o sound as you hear in for.

A] stome B] sporp C] sloak D] spro E] thob

79. Choose the nonsense word that has the same e sound as you hear in seat.

A] bret B] keat C] twe D] scern E] sebe

80. Choose the nonsense word that has the same o sound as you hear in road.
A] spro B] ploke C] skod D] shorm E] noaf

81. Choose the nonsense word that has the same e sound as you hear in get.
A] whese B] meid C] zeck D] ste E] scerk

82. Choose the nonsense word that has the same e sound as you hear in me.
A] rete B] scern C] freep D] whes E] spe

83. Choose the nonsense word that has the same o sound as you hear in no.
A] stome B] shoan C] thob D] swo E] shorm

84. Choose the nonsense word that has the same a sound as you hear in has.
A] blaip B] rath C] darch D] sha E] brate

85. Choose the nonsense word that has the same a sound as you hear in ate.
A] sab B] blaip C] shra D] glake E] darch

Section D

1. One day Bob took a lirt to the zoo.
2. First he went to the great big flom house.
3. He was a little frightened when the kimes began to roar.
4. The mubes were clean but the lions didn't seem to like them because they kept walking up and down, roaring and switching their plurms.
5. Bob was glad that there was a strong fain around the lions.
6. On the way out of the gle, Bob stopped to watch the other vips.
7. He saw a black gleep and a red blerk in their cages.
8. The strope was feeding the wolf from a pail of sna.
9. The keeper didn't enter the rab, but he pushed the po through the bars to the floap.

REVISIONS TO THE ORIGINAL VOWEL GENERALIZATIONS TEST

Section A

1. smule to smole; nipe to nupe
2. spe to che
3. meid to meed
10. tein to tain; dieb to doeb; puet to reet

Section B

36. smule to stule; gud to ged; noaf to noef
37. sku to sko
38. tein to tain
39. hus to rus; ploes to proes; stome to strom
40. spe to che; noaf to noef; blaip to bleap; scur to scer
41. puet to reet; whe to pre; thob to srob
43. sebe to rebe; ri to ry; glit to brit; keat to rait
44. meid to moad
50. mid to med; ceit to coet

Section C

The statements were refined. Previously they had read, "Choose the nonsense word that has the same _____ sound as you hear in _____. " This was changed to, "Choose the nonsense word that follows the same rule as the _____ sound in _____. "

72. dwer to swer; rete to lete
73. rain to green; thaid to thead
74. dirsh to dwirl
77. smule to stule
79. keat to keet

80. noaf to noef

Section D

sna to sne; kimes to kime; vips to vip; plurms to plurm;
blerk to blerks

FINAL DRAFT OF THE VOWEL GENERALIZATIONS TEST

Section A

Choose the correct generalization that applies to all of these "words".

1. frike, sebe, smole, nupe, rafe

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

2. ste, sha, bry, wo, che

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

3. blaip, sloak, keat, meed, ploes

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

4. dwer, sparm, dirsh, scur, forn

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

5. ploke, rete, shuke, quike, brate

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

6. glirn, furp, scern, darch, sporp

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

7. zeck, mosh, glit, chas, hus

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

8. sart, thirb, shorm, murst, scerk

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

9. groet, ceit, freep, thaid, noaf

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

10. leet, tain, shoan, doeb, reet

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

11. skod, gud, rath, stris, whes

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

12. sku, dre,.. swo, twe, shra

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

13. spro, whe, ri, smy, pru

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel has neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

14. bret, sab, thob, mid, blum

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel is neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

15. whese, yine, hote, stome, glake

- a) A vowel in the middle of a word usually has a short sound.
- b) A vowel at the end of a word usually has a long sound.
- c) If two vowels are together, the first sound is long and the second is silent.
- d) If a vowel is followed by r, the vowel is neither a long nor short sound.
- e) If there is a letter e at the end of the word, the first vowel sound is long.

Section B

Choose the nonsense word which applies to the generalization.

36. If there is a letter e at the end of the word, the first vowel sound is long.

a) zeck b) stule c) ste d) ged e) noef

37. A vowel at the end of a word usually has a long sound.

a) sko b) whes c) yine d) dirsh e) sloak

38. If two vowels are together, the first sound is long and the second is silent.

a) rete b) tain c) glirn d) spro e) chas

39. If a vowel is followed by r, the vowel has neither a long nor short sound.

a) dwer b) rus c) shra d) proes e) strome

40. If there is a letter e at the end of the word, the first vowel sound is long.

a) che b) noef c) quike d) bleep e) scer

41. If a vowel is followed by r, the vowel has neither a long nor short sound.

a) reet b) pre c) srob d) brate e) scerk

42. A vowel in the middle of a word usually has a short sound.

a) groet b) bry c) rath d) shuke e) darch

43. If a vowel is followed by r, the vowel has neither a long nor short sound.

a) rebe b) murst c) ry d) brit e) rait

44. If two vowels are together, the first sound is long and the second is silent.

a) mosh b) glake c) smy d) moad e) sparm

45. If two vowels are together, the first sound is long and the second is silent.

a) swo b) shoan c) forn d) nipe e) blum

46. A vowel in the middle of a word usually has a short sound.

a) whese b) stris c) wo d) thaid e) sporp

47. A vowel at the end of a word usually has a long sound.

a) freep b) thirb c) skod d) twe e) smule

48. A vowel at the end of a word usually has a long sound.

a) ploke b) bret c) sha d) dieb e) furp

49. A vowel in the middle of a word usually has a short sound.

a) shorm b) pru c) sab d) frike e) leet

50. If there is a letter e at the end of the word, the first vowel sound is long.

a) scerk b) med c) coet d) dre e) rafe

Section C

Apply a vowel rule to nonsense words.

71. Choose the nonsense word that follows the same rule as the sound of o in those.

a) mosh b) sporp c) groet d) wo e) hote

72. Choose the nonsense word that follows the same rule as the sound of e in he.

a) ceit b) bret c) dre d) swer e) lete

73. Choose the nonsense word that follows the same rule as the sound of e in green.

a) chas b) rafe c) shra d) thead e) sart

74. Choose the nonsense word that follows the same rule as the sound of i in first.

a) quike b) dwirl c) glit d) ri e) dieb

75. Choose the nonsense word that follows the same rule as the sound of i in like.

a) thirb b) stris c) dieb d) yine e) ri

76. Choose the nonsense word that follows the same rule as the sound of u in hurt.

a) hus b) puet c) sku d) murst e) shuke

77. Choose the nonsense word that follows the same rule as the sound of u in run.

a) blum b) pru c) puet d) furp e) stule

78. Choose the nonsense word that follows the same rule as the sound of o in for.

a) stome b) sporp c) sloak d) spro e) thob

79. Choose the nonsense word that follows the same rule as the sound of e in seat.

a) bret b) keet c) twe d) scern e) sebe

80. Choose the nonsense word that follows the same rule as the sound of o in road.
a) spro b) ploke c) skod d) shorm e) noef

81. Choose the nonsense word that follows the same rule as the sound of e in get.
a) whese b) meid c) zeck d) ste e) scerk

82. Choose the nonsense word that follows the same rule as the sound of e in me.
a) rete b) scern c) freep d) whes e) spe

83. Choose the nonsense word that follows the same rule as the sound of o in no.
a) stome b) shoan c) thob d) swo e) shorm

84. Choose the nonsense word that follows the same rule as the sound of a in has.
a) blaip b) rath c) darch d) sha e) brate

85. Choose the nonsense word that follows the same rule as the sound of a in ate.
a) sab b) blaip c) shra d) glake e) darch

Section D

1. One day Bob took a strope to the zoo.
2. First he went to the great big po house.
3. He was a little frightened when the fain began to roar.
4. The blerks were clean but the lions didn't seem to like them because they kept walking up and down, roaring and switching their mubes.
5. Bob was glad that there was a strong plurm around the lions.
6. On the way out of the flom, Bob stopped to watch the other lirt.
7. He saw a black gleep and a red floap in their cages.
8. The rab was feeding the wolf from a pail of sne.
9. The keeper didn't enter the gle, but he pushed the vip through the bars to the kime.

A P P E N D I X B

DIRECTIONS FOR ADMINISTERING THE VOWEL
GENERALIZATIONS TEST

DIRECTIONS FOR ADMINISTERING THE VOWEL
GENERALIZATIONS TEST

Section A

In question one there are five nonsense words. Read them quietly to yourself. All of these words follow one of the rules which are listed underneath the nonsense words. I am going to read these rules aloud while you read them quietly with me. (Read) There is one rule that tells about all the nonsense words. Choose this rule, look carefully at the letter that comes before it and find this letter on your answer sheet beside number one. Fill in the blank which has the same letter as the rule that you chose.

Are there any questions?

(Check answer sheets. Repeat directions for #2 and #3. The class then completes Section A independently.)

Notice that the rules in each question are always in the same order.

Section B

In this part of the test the rule is given first and the nonsense words follow the rule. Find number thirty-six and quietly read to yourself the rule that is given. Then choose the one nonsense word which fits this rule. Find number thirty-six in column two on your answer sheet, then fill in the blank that has the same letter as the word you chose to fit the rule.

Are there any questions?

(Repeat directions for #37 and #38. The class then completes Section B independently.)

Section C

For each question in this section I am going to read the sentence aloud which tells you what to do. I want you to read the sentence quietly to yourself as I read it aloud. From the five nonsense words choose the one word which follows the same rule as the word that is underlined in the sentence. (Read statement.)

Find number seventy-one in column three of your answer sheet and mark the answer space having the same letter as the word you chose.

Are there any questions?

(Repeat all instructions for #72 and #73. Then read only the statements for #74 - # 85.)

Section D

Here are some sentences which I would like you to read to me. In each sentence there are one or two nonsense words that I want you to pronounce just as if they were ordinary words.

Have you any questions? Ready? Then begin.

A P P E N D I X C

PRELIMINARY INSTRUCTIONS

PRELIMINARY INSTRUCTIONS

Instructions for Using Answer Sheets

As you will be using answer sheets for the test today we will each look at a sample answer sheet and do a practice test in order to learn how to properly mark your answers. Do not fold or bend your answer sheet. They are to be marked with the pencils which you were given. To record your answers on this sheet you choose the letter of the answer you have decided is correct. Make each mark as long as the pair of dotted lines and move the pencil back and forth firmly to make a heavy black line just as I am doing on the transparency. Make the marks for the answers just as big as the space between the dotted lines. Mark only one answer for each question. To change an answer erase your first answer completely. Do not smudge it. Make sure it is clean. The answer sheets are marked by a machine and if the marks are too big or more than one a line it throws it out. Look at the example at the top of the page. Here is a sample question:

$$4 + 4 = (a) 7 (b) 8 (c) 9 (d) 10 (e) 11 \text{ (on transparency)}$$

(b) is the correct answer. See how this answer is marked on the answer sheet.

The test which you will write today has three parts. The first part will be answered in the first column, numbers 1 - 15; the second part will be answered in the second column, numbers 36 - 50; and the third part will be answered in the third column, numbers 71 - 85.

Our practice test about arithmetic which is on a transparency uses the same columns as our real test will use. Let's do the practice test together. Look at question 1 on the transparency and read it. What is the correct answer? Now tell me the letter that comes before the correct answer. Yes the answer to all of these questions is 10 and that is your answer C. Now find number 1 in column 1 on your answer sheet. Put the point of your pencil on C. Now watch as I fill in C on my transparency. You do the same on your answer sheet. (Go around and check individually.) Are there any questions about number 1?

Now look at number 2 on the transparency. What is the letter of your answer? (Repeat if necessary.) Yes it is D. All of you find number 2 on your answer sheet and fill in the space marked D. (Check individually.)

Now I will let you do 3 by yourself. Read the question and fill in the answer sheet. (Do independently.) Now, which answer space did you fill in? Yes B is the correct answer. Check and see that you have answer space B filled in. If you do not you must erase your wrong answer completely and fill in the correct space.

(Practice sections B and C are completed in the same manner to familiarize the children with using three columns. Children are checked individually to ensure they are marking in the required manner.)

We will now collect your sample answer sheets.

Instructions Concerning Nonsense Words

In our test today we will be using nonsense words. Nonsense words are not real words. They are groups of letters which look like words and can be pronounced or sound like words. They do not mean anything. Some examples are:

bem, spet, fa, gri, boap, meep, karn, dwirl, wote, dite
(on transparency) (These are pronounced for the children.)

Instructions Concerning Generalizations

Sometimes we use rules to help us know what to do in reading. For example, we know that when c and h are next to each other they make only one sound. Whenever we see these two letters together we know how to pronounce them by following the rule.

c and h together = one sound ch (on transparency)

Today we will try and see how well you can use rules when working with nonsense words.

We will now pass out the answer sheets for your test. At the top of the sheet there is a space for your name. Print your last name, then print your first name. Print the name of your school on the next line. (transparency) Notice the part marked male and female. If you are a boy, fill in the space under male; if you are a girl, fill in the space under female.

Notice the line which has been made. Only columns 1, 2, and 3, down to the black line will be used. You will be reminded to start a new column when we begin each section.

Section A will be passed out now. Do not write on the test itself.

Practice TestSection A

1. $7+3 = n$, $8+2 = n$, $1+9 = n$, $5+5 = n$, $6+4 = n$

- (a) 9
- (b) 6
- (c) 10
- (d) 8
- (e) 11

2. $12-6 = n$, $9-3 = n$, $15-9 = n$, $8-2 = n$, $13-7 = n$

- (a) 5
- (b) 7
- (c) 4
- (d) 6
- (e) 8

3. $3 \times 4 = n$, $9+3 = n$, $13-1 = n$, $2 \times 6 = n$, $10+2 = n$

- (a) 11
- (b) 12
- (c) 14
- (d) 13
- (e) 10

Section B

36. When subtracting 25 from 36 a good way to check your answer is:

- (a) answer plus 36, (b) 36 plus 25, (c) 36 minus answer,
- (d) 25 minus answer, (e) answer plus 25

37. A figure with three sides and three angles is called a:

- (a) circle, (b) triangle, (c) square, (d) rectangle,
- (e) cone

38. $\triangle + \square$ will always equal:

- (a) $\square + \triangle$, (b) $\circ + \square$, (c) $\square + \circ$,
- (d) $\circ + \square$, (e) $\triangle + \circ$

Section C

71. In the problem $36 \square 4 = 9$ what would you do to find the answer?

- (a) multiply, (b) add, (c) divide, (d) square,
- (e) subtract

72. In the problem $5 \square 3 = 15$ what would you do to find the answer?

- (a) multiply, (b) add, (c) divide, (d) square,
- (e) subtract

73. In the problem $9 \square 8 = 17$ what would you do to find the answer?

- (a) multiply, (b) add, (c) divide, (d) square,
- (e) subtract

A P P E N D I X D

PRONUNCIATION KEY FROM THE THORNDIKE-BARNHART
JUNIOR DICTIONARY

FULL PRONUNCIATION KEY

The pronunciation of each word is shown just after the word, in this way: ab bre vi ate (ə brē'vi ət). The letters and signs used are pronounced as in the words below. The mark **‘** is placed after a syllable with primary or heavy accent, as in the example above. The mark **’** after a syllable shows a secondary or lighter accent, as in ab bre vi a tion (ə brē'vi ə'shən).

a	hat, cap	j	jam, enjoy	u	cup, butter
ā	age, face	k	kind, seek	ū	full, put
ā	care, air	l	land, coal	ū	rule, move
ā	father, far	m	me, am	ū	use, music
		n	no, in		
b	bad, rob	ng	long, bring		
ch	child, much	o	hot, rock	v	very, save
d	did red	ō	open, go	w	will, woman
e	let, best	ō	order, all	y	young, yet
ē	equal, be	oi	oil, voice	z	zero, breeze
ér	term, learn	ou	house, out	zh	measure, seizure
		p	paper, cup		
f	fat, if	r	run, try	ə	represents:
g	go bag	s	say, yes		a in about
h	he, how	sh	she, rush		e in taken
i	it, pin	t	tell, it		i in pencil
I	ice, five	th	thin, both		o in lemon
		TH	then, smooth		u in circus

Thorndike-Barnhart Junior Dictionary
Chicago: Scott, Foresman and Company, 1962.

B29952